

The Mining Journal

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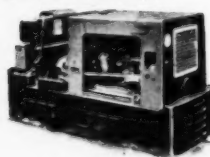
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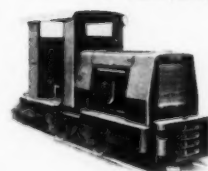


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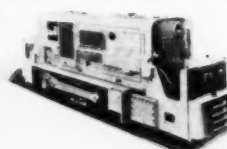
3½—4½ tons (20-30 h.p.)



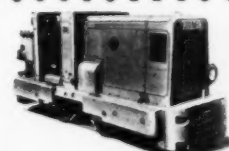
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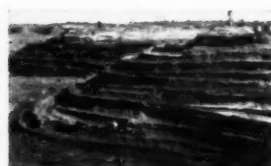
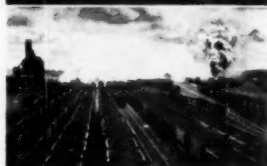
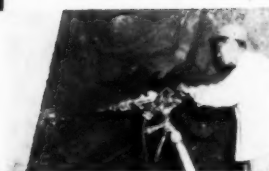
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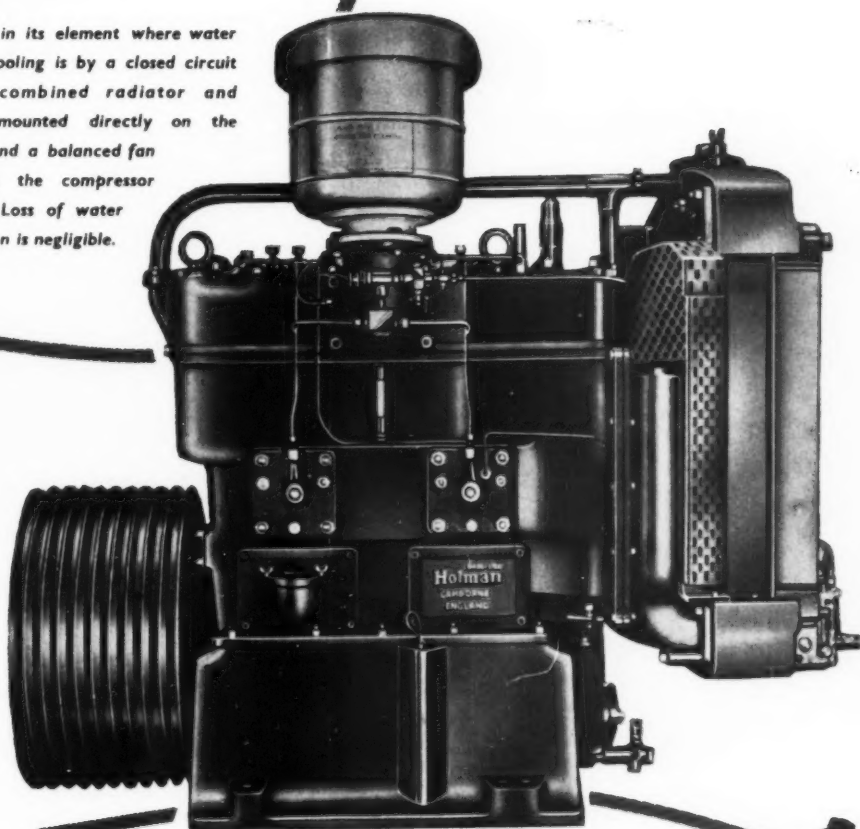
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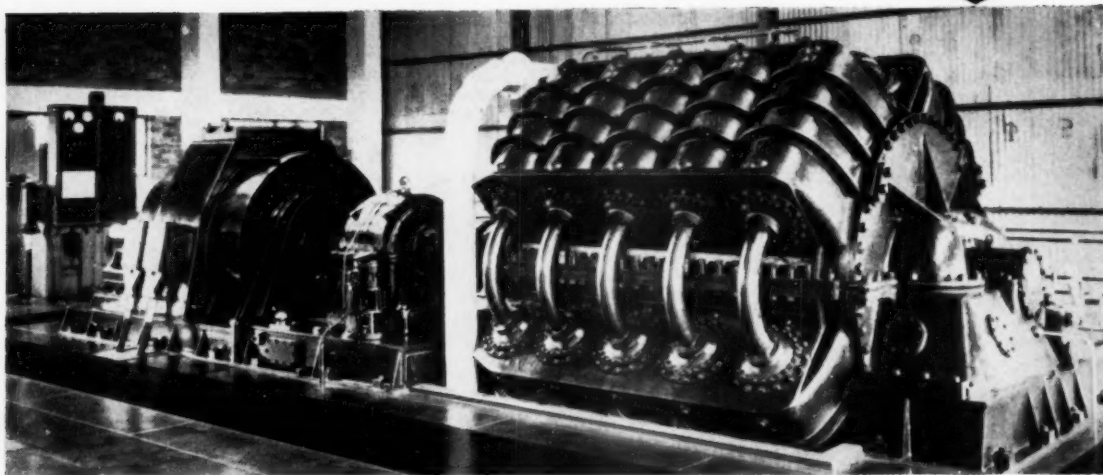
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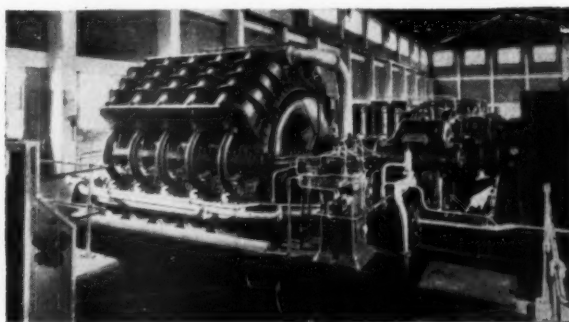


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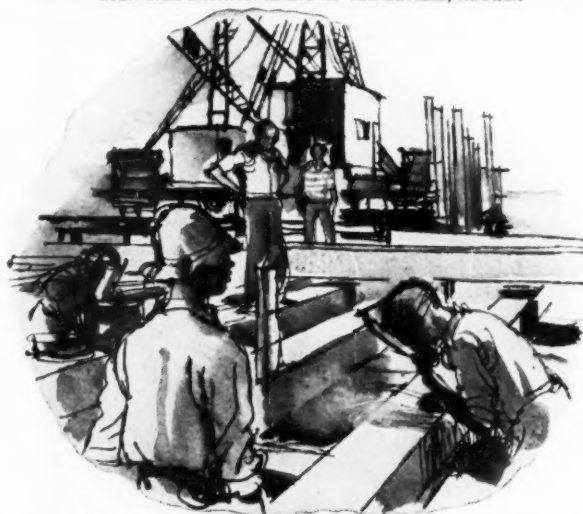


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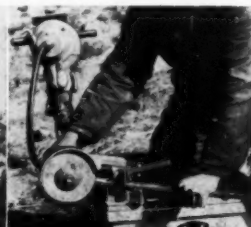


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The Mining Journal

London, November 23, 1956

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Joint Editors

U. Baliol Scott R. Bruce Dunfield

News Editor

A. G. Thomson

Financial Editor

I. M. Moseley

Assistant Editor

R. Bowran

Display Advertisement Manager

E. S. Hooper

Circulation

Robert Budd

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Report on the Copperbelt

THE companies of the Northern Rhodesian Copperbelt have been reporting in the last week on a year of exceptional prosperity. "Your Company" says Sir Ernest Oppenheimer as chairman of Rhokana, "has never had a more profitable year. Record production, record prices for copper and an operating year during which Rhokana was, until the last month of the year, free of industrial troubles and was, therefore, able to carry on almost uninterrupted productive operations, have resulted in record profits and permitted the payment of a record dividend". Sir Ronald Prain, as chairman of Mufulira, states, "The year ended June 30, 1956, was a year of virtually full production, in which all previous production records were beaten, and the expectation that it would be at a profitable level is amply reflected in the accounts". *Annus Mirabilis* for the Copperbelt! It is hardly to be expected that copper prices in the current year can make a repetition possible.

It was not wholly free of trouble. As Sir Ernest said, the year closed in less joyful mood because the first of the chain of African strikes which led up to the current Commission of Inquiry into the causes of unrest on the Copperbelt fell within the year being reviewed. There is little comment on this problem; partly because it falls largely in the next year's purview, and partly because the whole matter is *sub judice*. But the main reason why African Advancement bulks less large in this than in earlier reports is that the problem is no longer the issue it was. The first step has been made. This is the time for consolidation. Sir Ernest also wisely remarks "The African is slowly taking his place in the industrial field and I think it would be too much to expect that this evolutionary progress from a purely agricultural environment to a highly industrial one, in which responsibility is the keynote, could be achieved without some difficulty".

The theme that runs through the present set of reports is the growth of the copper industry in the context of a developing society. Most important, perhaps, is the news that a decision has been taken to open up Mufulira West since the extent of the orebody, though still unknown, is "well beyond the previously anticipated limits". The plans are not yet completed but an expansion of the order of 50 per cent is expected. Mufulira is indeed "one of the great underground copper mines of the world". Chibuluma is now well and truly launched and is expected to be a profitable enterprise. Work at Chambishi is proceeding well. Bancroft is proceeding with the second stage of its development. Outside of the copper industry proper, both groups report on the loan of £20,000,000 over five years for the Kariba project and the agreement to accept power at a price that will provide another £10,000,000. Both groups can take pride in their support of technical education on the Copperbelt. There has been general support too for the establishment of a merchant bank to operate in the Federation. Rhoanglo reports on the loan of £1,000,000 to the railways and the provision of another £5,000,000 for the purchase of trucks. The Mufulira Copper Mines report contains the announcement of the Kafue Flats project and the loans to the

Northern Rhodesian and the Nyasaland governments for use in African development. The statements of intention show divergence, however.

"The interests of your Companies" says Sir Ronald, "rest exclusively within the Federation of Rhodesia and Nyasaland and at present predominantly in copper. It seems unlikely that geographically our interests will spread, but on the other hand we would hope that over the years we shall be able to diversify our business so that it no longer depends exclusively on copper, though this will probably remain predominant. . . . It is my conviction that the prosperity of the country and the prosperity of the copper mining industry are indivisible and that your companies must inevitably face duties and responsibilities which go far beyond those which normally concern the management of a mining enterprise". This is both a bold and a clear statement of objectives in general terms. That Sir Ronald believed that his companies could not prosper unless the Federation prospered was well known. Nevertheless, it will give most people food for thought that he can say that copper will only "probably" remain predominant in this great copper mining concern.

Sir Ernest Oppenheimer has a slightly different emphasis. "A diversified economy in Rhodesia, while ultimately dependent upon the establishment of a great variety of secondary industry, demands at this stage concentration of effort upon the development of the existing primary industries—mining and agriculture—and upon the expansion of public utilities such as railways, roads and power supplies". Later he says "I am confident that Rhodesia remains a field for profitable investment and that although the country will have to tackle the normal problems which rapid expansion creates, the developments that are taking place and those which are planned will increase the capacity of the country to produce, export and earn, and that they will result in a more diversified economy which will secure a high standard of living for all its citizens". To crystallize these differences (with some inevitable distortion), it might perhaps be said that though both the leaders in the Copperbelt look forward to a common goal, Sir Ronald seeks to stimulate that diversity which Sir Ernest thinks will flow naturally from a country with sound basic industries and a reasonable system of public services which both groups are clearly doing their best to foster.

Sir Ernest does, however, enter one *caveat*. "It is important that government should, through sound and orthodox financial policies, seek to maintain conditions in the Federation that will encourage the continuation of large-scale investment here. It would be unwise to depart from normal methods of raising capital funds, and any resort to unusual financial expedients will tend to undermine the confidence of people to whom we must look for the maintenance and development of prosperity. We are inclined to think, for instance, that the recent increase in railway rates on copper verges on being an unsound method of raising funds, as it seems to introduce a discriminatory tariff for purposes that go beyond the ordinary revenue requirements of the railway . . . the mines are being called upon to subsidize the unprofitable sections of the railways and to provide capital funds out of revenue". No such condemnation appears in the R.S.T. group reports.

The complaint is an interesting one. Sir Ernest is perfectly correct in saying that nothing is more likely to frighten off potential investors than a tradition of arbitrarily fixed and discriminatory imposts levied on such sectors of enterprise as seem capable of bearing them. This is a serious warning and the authorities should take the most careful note of it. But Sir Ernest goes further. "... the new rates will clearly be an important factor in determining the profitability or otherwise of other, smaller

copper mining ventures within the Federation. . . ." Since both groups hint strongly of the need to raise further capital for development this is a warning that even they cannot produce unlimited golden eggs regardless of their treatment.

Looking further ahead it is impossible to avoid the prospect of future difficulty arising as between government and the copper companies from both the weight and the method of taxation as the diversifying of the Federation economy gets more and more under way and with the need for greater public expenditure. Plainly, if the railways can get away with a discriminatory and penal tariff it offers a temptation to raise money for other public utilities in the same way. Sir Ernest admits that the copper companies in their present state of prosperity can well afford to pay the new railway rates, and Sir Ronald is not moved to condemn the charges, again confirming the impression that they are not by any means more than can be borne; but it is always as well to establish your point at the outset and not to let precedents be established by default. It is a good point to make at the outset of the Federation.

CENTRALIZED SERVICES FOR SOUTH AFRICAN MINES

The rational approach of the South African mining industry to current problems is well illustrated by examples given in the latest issue of *The Mining Survey*, which is devoted to the work of the Transvaal and Orange Free State Chamber of Mines. Sixty-five gold mining companies, including 18 uranium producers, 24 coal mining companies and 13 financial corporations, form the ordinary membership of the Chamber, which might be described as a central organization set up by the industry to undertake those services which can most efficiently and economically be provided on a co-operative basis.

In the sphere of labour relations, the Chamber negotiates industry-wide agreements, attracts and engages European and African labour, and conducts research and training schemes. One important aspect of this work—training for mine management and its related problems—is, in fact, the subject of a series of three articles in *The Mining Journal*, the last of which appears in the current issue. The organization structure discussed in these articles might be likened to a pyramid based on the individual mine and rising upwards through the groups to the Chamber as the apex.

The Chamber is also responsible for the supply of certain materials, advances the ideals of industrial safety, compiles and circulates important statistics, refines gold and prepares uranium oxide for shipment, extracts and markets by-products of gold mining, and provides secretarial, legal and other specialist services, including certain welfare services.

Last, but by no means the least important, of the Chamber's aims is to increase public knowledge and understanding of gold, coal and uranium mining. *The Mining Survey*, an illustrated quarterly publication, is itself an example of the Chamber's work in the field of public relations. It is clearly of considerable value in giving shareholders a comprehensive and accurate picture of the South African gold mining industry. In recording the achievements and problems of the industry, the Chamber has a story of absorbing interest to tell. We understand that, particularly in the Union itself, circulation is by no means confined to shareholders of the mining companies. The publication should be of considerable interest to British schools, where it might well play a valuable part—if indeed it does not already do so—in alleviating the industry's

chronic shortage of skilled manpower by bringing the attractions of a mining career to young men of the type required.

WORLD CONFERENCE ON NICKEL

A three-day conference on nickel opened at Geneva on Tuesday, November 20. This was the first post-war large-scale conference on nickel marketing problems to be held on the Continent. Organized by the Mond Nickel Co., who called together their representatives from the U.K. and many parts of Europe, it was devoted to matters relating to availability of nickel in relation to industry's expanding requirements in all countries, and to questions concerning production and distribution of primary nickel products. In a foreword to the conference programme, Mr. L. H. Cooper, chairman of Mond Nickel and vice-president of INCO, pointed out that, since the last international meeting, held in England in 1949, the INCO-Mond organization had continued to make great progress in the fields of research and new developments, as well as in the exploration for new resources, and the same progressive policy would continue in future.

The Business and Defence Services Administration of the U.S. government predicts that the supply of nickel next year will show some improvement, provided the *status quo* is maintained between military and civilian requirements and stockpile diversions are not revised. No assurance was given, however, that the supply of nickel would be sufficient to establish a balance between supply and demand in this critical material.

Mr. Henry D. Lytton, a former U.S. government metals specialist, is of the opinion that nickel demand may surpass present U.S. consumption rates of 126,000 s. tons per year by a large tonnage, without allowance for stockpiling. His study analyses nickel consumption factors operating in the U.S. over the last 45 years, developing trend figures not previously available. It projects basic nickel demand for ten years ahead. A total nickel demand of 89,250 tons for steel-making, plus a further 98,500 tons for non-steel uses is foreseen by 1965.

This analysis takes into account a present-day requirement of 12,000 tons of nickel in "super-alloy" stainless steels for jet-engine manufacture, but no allowance can be made for expanded commercial and military jet-engine, atomic energy, supersonic and other high temperature needs, and for miscellaneous new uses for nickel. It is pointed out that, if the first half 1956 rate of jet-engine super alloys were to be quadrupled in the next decade, total demand for nickel would automatically be increased to the approximate ODM goal's level. A practical gas-turbine motor car might call for up to 20,000 additional tons of nickel yearly. Supersonic aircraft fuselage needs have yet to be conjectured. Other new uses in electronics, nickel-plating, building exteriors, and similar fields, are being held back by scarcity of the metal.

Some observers of the nickel market in the U.S. are displaying concern as to how the premium-priced market for high-cost production nickel, which is diverted from the government stockpile and sold to industrial consumers, may affect ODM's plans for expanding the nickel production goals. According to some views in the trade, nickel produced at a high cost and diverted from the stockpile is being sold from around 90 c. up to \$1.25 per lb. This compares with the published nickel price of 64.50 c. There is no authoritative figure available as to what quantities are being sold at the premium price in Canada and the U.S., but the total appears to be in the vicinity of nearly 20 per cent of the North American nickel production.

In London firm conditions continue to characterize the free nickel market. Generally speaking, demand remains at a high level and all available production is disposed of without difficulty at inflated prices. In the U.K. the free price is still put in the region of £1,500 per ton, but most of Britain's requirements are covered under long-term contracts on the basis of £519 per ton delivered users' works. On the Continent free nickel prices are said to range from £2,100 up to as much as £2,400 per ton. There is at present no indication of the price at which Japan would offer new forward business, largely because she is well committed for some time into 1957. Japanese prices were earlier mentioned at about £1,800 per ton c.i.f. Europe for 1957 shipment.

The Japanese Nickel Association, composed of six nickel refiners and nine nickel exporters, has announced the names of countries where the nine trading firms are to conduct surveys, through their own branches and resident representatives, on nickel demand-supply relations, export markets, and the nickel ore supply situation. The countries selected are Australia, Brazil, Cuba, France, Greece, the Philippines, the U.S. and West Germany. The investigations in Brazil, Cuba and the Philippines will concentrate on nickel ore supplies.

A report from New York states that INCO is almost ready to go ahead with the transition of its Mystery-Moak Lakes nickel ore discovery in Manitoba into one or more mines. The property is located in the northern part of Manitoba about 400 miles north of Winnipeg. The ore body contains some of the metals in the platinum group, together with gold and silver, and has only traces of copper. The mine is expected to become the world's second largest nickel producer, exceeded only by INCO's major nickel mines in the Sudbury area of Ontario. Present plans call for the overall expenditure of nearly \$150,000,000 to bring the property into production by 1960 at an initial rate of from 25,000 to 30,000 s. tons of nickel a year. Development of the property will cost over \$100,000,000. Another \$30,000,000 will be required to build a hydro-electric power plant at Grand Rapid on the Nelson River, 40 miles north-east of Moak Lake. In addition, a railway 25 miles long will be laid down from the main Canadian National Railways' Hudson Bay line to the mines, at a cost of about \$4,000,000, or roughly \$150,000 a mile.

FREIGHT RATES RISING

The highest rate for trans-Atlantic coal freight since the Korean conflict has been reached with the payment of 89s. per ton for a shipment from Hampton Roads to Rotterdam. It thus appears that coal shipping lines are not unduly perturbed by the prospective threat to their operations resulting from the formation of American Coal Shipping Incorporated (*Mining Journal*, October 19, 1956). Perhaps the difficulties of A.C.S.I. in getting an organization together have at least temporarily removed any stimulus of increased competition.

The 30 Liberty ships chartered from the government by the newly-formed company have not all been selected and none is expected to be in service for some months yet. Meanwhile, Coal Shipping Incorporated is negotiating for the purchase of the Bull Shipping Line which operates a fleet of 15 cargo vessels. Acquisition of this fleet would greatly expedite the plans of the A.C.S.I. and as this is a non-governmental transaction there will presumably be no restriction on return cargoes. The chartering of the Liberty ships on the other hand has only been effected on condition that return cargoes be limited to ore.

Some Problems of Group Management

A GROUP of gold mines in South Africa has different problems facing it from those commonly found in a group of manufacturing or commercial units sharing a common administration. In some ways the problems are simpler and in some more complex. While an industrial group's activities are usually diverse, the reverse is true of a group of gold mines. The activities of each unit are similar, sharing many problems in common; units are independent of each other, and have no marketing problems; personnel is readily interchangeable from mine to mine and there is a wide field in which uniform administrative and technical policy is both possible and desirable. On the other hand the problems facing the management of a gold mine are commonly of a highly complex technical nature, and require expert detailed local knowledge and experience for their solution.

Two problems a gold mining group has to face which an industrial group does not, are that as most mines have short lives, the group must provide for their replacement if it is to preserve continuity; and that new mines require very large quantities of risk capital to bring them to production. Both conditions favour the control of mining enterprises by powerful corporations with large financial resources.

It is for these reasons, of course, that the mining groups in South Africa, most of which have both mining and industrial interests, usually keep the administration of the two types of activities severely apart. For an industrial group, experience here and elsewhere has shown that a heavily centralized management and administrative organization is not suitable, because it is not flexible enough to meet the changing demands made on it by a competitive economy. Even in these days of larger and larger industrial combines, the tendency is towards decentralization of control and authority to divisional, area or unit management.

However, this argument does not apply to a group of gold mines. Conditions are not competitive, and the many advantages and economies which would arise from centralized control and administration in fact led to the development of the group system. Further, in the early days of Witwatersrand mining, it was quickly recognized that there were certain problems which could be handled more effectively by an authority representing the whole industry than by individual groups. This led ultimately to the establishment in its present form of the Transvaal and Orange Free State Chamber of Mines, which handles many matters of policy and administration on behalf of its individual members, including the recruitment and distribution of labour, relationships with the trade unions and conditions of employment, relationships with the government, education, training and research, and certain matters of public relations. In cases where general policy for the industry is determined by the Chamber of Mines, the individual groups assume responsibility for putting it into effect on their own mines and must usually elaborate and define in detail the general industrial policy to suit their own conditions and requirements.

At What Level Should Decentralization Commence?

In addition, the groups have found it expedient to develop in their head offices a wide range of administrative and technical services for their mines, including technical

consultant's services, centralized buying, secretarial and legal departments, personnel and medical services and various other activities. In order for these to operate efficiently and economically, there must be a wide measure of uniformity of administration and co-ordinated policy within the group organization. Although it is clearly correct for a mining group to secure uniformity of policy within the group on all sorts of matters from standardization of equipment, methods and administrative procedures, to personnel management, it must be careful to limit its authority to those fields which really do benefit from a centralized policy and to define clearly where its general authority is terminated. Otherwise there is a tendency for head-office specialist departments to indulge in empire building, and to become top-heavy, inflexible and bureaucratic; and what is more serious in the technical departments is that they find themselves engaged more and more in routine matters, when they should be devoting their time to the provision of expert technical advice and services.

By R. A. L. BLACK, A.R.S.M., A.M.M.

This week we conclude Professor Black's short series of articles on mine management in South Africa with some comments on the limitations of centralization in the gold mining industry together with his analysis of the relationship between the mine manager and the numerous specialists whose activities have to be co-ordinated with his own and with those of his subordinates. The author also comments on the relationship of the specialist to the board room.

If line and staff relationships are properly understood and appropriately organized in a group of companies, it may be thought that it does not matter much which specific tasks and duties are performed by head-office and which by the individual companies. In practice, particularly in mining, it matters a great deal. Each mine is as individual as a ship at sea, and each situation, like a sea battle, is unique. The First Sea Lord and his staff may pore over the charts and telegrams at the Admiralty, they may bombard the Commander-in-Chief with information, and pious hopes, but they must not attempt to plan or fight the battle. Policy and strategy are the responsibility of the Admiralty, tactics of the Commander-in-Chief. So with a mine, the only people who are sufficiently close to the situation to plan and direct operations, the tactics of mining, are the manager and his staff on the mine itself.

It should be a firm principle that responsibility for all but the broadest issues, which may be termed policy and strategy, should be delegated to the manager and his staff at the mine. For an underground manager to arrogate to himself the responsibilities of his mine captains is never a satisfactory solution to the problem of selecting and training suitable mine captains. It is a mistake to attempt to compensate for weak mine management and inadequate technical staff at the mine by providing in head-office the planning and directing facilities which should rightly be available at the mine.

The solution to this problem, as suggested in the previous articles, must lie in strengthened mine management structures and in the proper training and development of both line and staff officials on the mines. An important part of this training is to indoctrinate all members of the organization with a proper understanding of line and staff relationships and to ensure that the specialists constantly relate their activities to the main purpose for which the enterprise exists, that is to mine ore and recover gold at a profit. If this is done, and if policy is clearly defined and authority is properly delegated to the mine management, conflict between the staff and the executive, or between head-office and the mine management, should not arise.

The Role of the Specialist in Framing Policy

The group head office has three functions to perform in relation to its mines: first, to regulate general group policy applicable to all mines; second, to provide consultative, technical and administrative services; and third, to direct policy for its individual mines. Policy, both general and particular, is the outcome of specialist advice, technical, financial and administrative, all of which are represented in head office by departments and sub-departments specially equipped and staffed to give it.

Generally it is unsound to divest those whose job it is to give specialist advice of responsibility for decisions which may be based on their advice. It is not suggested that they should assume direct executive responsibility; that would, of course, inevitably lead to conflict between line and staff. But it does mean that senior specialists should take a direct part in policy making and therefore bear their share of the responsibility for the policy formulated. The execution of the agreed policy must remain in the hands of the executive, the specialists at this stage reverting to their normal staff relationship. But unless they are concerned with the formation of policy as a whole,

it is most difficult for specialists to relate their own function and interest to the total situation, and there is also the danger that departmental self-interest will colour their advice.

Many industrial organizations, and the practice is more common in the U.S.A. than in Britain or South Africa, have overcome this difficulty by appointing the heads of the main specialist departments or groups of departments to board membership. They then have two separate and distinct duties to perform. First, as board members, to assist in the formation of policy, the execution of which is, of course, in the hands of the chief executive; and second, as department heads they have the duty of carrying agreed policy into effect as far as their own departments are concerned under the direction of the chief executive. This does not preclude representation on the board of major groups of shareholders and other independent people who are appointed by reason of their special knowledge or interests. It does, however, ensure that fully informed specialist advice is available at the place where it is most required, the board room, the main source of company policy. In a very large group of mines where the main board may delegate responsibility to sectional boards and finally to individual company boards, the same principle should apply at each level. The thread of executive direction would be maintained through the managerial department, and at each level there would be representation of the main specialist functions through senior officials of the departments concerned.

Provided that the junior boards really perform their function of formulating policy within the general framework handed down to them, the system has the added attraction of providing excellent training grounds for the development of future senior executives. This would considerably widen the field from which future senior executives could be drawn and mean that all departmental officials, from the technical, financial, personnel and administrative departments could aspire to top managerial positions.

The Editor writes:—

Excellent though the foregoing analysis is, we fear that Professor Black's references to "line and staff" relationships may be a little confusing to any readers not fully conversant with the jargon of business management. It may, therefore, be useful for us to attempt a fuller elucidation of this relationship which, we blush to confess, Professor Black has had to avoid through limitations of space.

In an industry such as mining, which is highly specialized in all its activities, it is especially necessary to be clear as to the rôle of a specialist service department (be it engineering, personnel, purchasing or whatever) *vis-à-vis* the main operating departments through which flow the "line" of command from managing director down to shift boss or mill charge hand. In Professor Black's view it is clear that these service departments, though vital in themselves, must be regarded by all concerned as ancillary to (i.e. as standing in a "staff" relationship to) the primary process of mining, ore treatment and (for almost any metal other than gold) sales. Without these primary functions there can be no enterprise for the service departments to facilitate, and the latter can therefore only have a significance in terms of the main purpose of the enterprise.

Naturally in a large organization, specialist service departments must have their own internal organization and line of command. The head of (for example) the personnel or engineering branches must be able to exercise discipline

over the members of his department throughout the organization, and within his department there must be clearly defined channels through which policies and instructions can be promulgated downwards and progress reports transmitted upwards. At the same time, the relationship of every personnel officer or member of the consulting engineer's department to his corresponding "line" executive, whether at the level of the managing director, the mine manager or the mine captain, remains in essence one of advice and facilitation; and difficulty is only likely to occur where specialists confuse their duty to act executively within their own branch with their duty to act in a service or "staff" capacity *vis-à-vis* the main operating departments.

The relationship of the specialist to the operating or "line" executive is not a matter of relative rank but is inherent in the organization structure wherever the services of a specialist have to be co-ordinated with the requirements of the operating departments. The difficulty lies in getting both parties to understand the nature of this relationship, and to recognize that the authority which the specialist wields *vis-à-vis* the "line" executive is the technical authority of the expert within the area of his *expertise*. Normally the "line" executive will respect this technical authority and indeed if he rejects it, he does so on his own responsibility—and at his peril if events prove him to be wrong. But, like the ship's captain, final authority and responsibility are his while he remains in command.

TUNNELLING

The Ume River Project, Sweden

AT the Stornaforsen project on the Ume River in North Sweden, a new world record, with regard to the volume of rock removed in a tunnel operation, has been achieved. As a result of a high degree of skill, backed by such developments in drilling techniques as the new Consolidated Pneumatic Fagersta Seco steel, the speed with which the tunnel has been completed is the greatest yet attained on any Swedish project, advancing 1,120 ft. in a 20 day month.

Work on the tunnel, which has been carried on from two headings with a height of 88 ft. a width of 52 ft. and a length of 2½ miles called for the drilling, blasting and removal of some 2,270 s.tons of rock per month. Handling this volume in one heading has been a Bucyrus-Eyrie 54B 3 cu. yd. excavator loading 780 cu. yds. per 8 hr. shift, whilst a Marion 3.9 cu. yd. type 111 M excavator has loaded the 20 ton Euclids at the rate of 1,170 cu. yds. each shift.

The tunnelling method used has been top heading and benching. The top heading measured 36 ft. high and 52 ft. wide, the rest of the rock being removed in two benches each 26 ft. high. Drilling equipment for the benching operation consisted of a specially designed, remote controlled, jumbo which carried 13 chain fed drill hammers, covering the entire width of the tunnel. The remote control was necessitated by the possibility of the presence of undetonated explosive in the floor of the heading. After three ft. had been drilled by remote control, the ground was then considered safe for the operators, each attending two drills, to take over control.

The remote controlled Jumbo using Atlas Copco "Lion" drills with C. P. Fagersta Seco Steel, at the Stornaforsen project

Consolidated Pneumatic Fagersta Seco 1 in. hexagonal drill rods were used in three changes only to drill to a depth of 32 ft. The steels, each with 6½ in. Fagersta shanks (rubber bushings) were a starter of length 6 ft. 7 in., the bit being a 2 in. integral cross bit, followed by a second rod of 19 ft. 9 in. length with a 19/16 chiselbit. The third rod, 33 ft. 10 in. in length, carried a 1 17/32 in. chiselbit.

Benching holes, inclined at 2.1, were drilled to a depth of 32 ft. with a burden of 5 ft. 7 in. and were spaced 5 ft. 7 in. apart, this interval being reduced to 3 in. for the holes adjoining the walls of the tunnel. In each blast, five complete rows of holes were fired together by millisecond delays, each such round using 1,100 lbs. of explosive.

With this equipment, two crews of 4 miners and one mechanic drilled 5 rows of holes in each heading per shift and on a 20 day month, this amounted to a total tunnel advance of 1,120 ft.



RECORDS

The Bella Drift Advance, Yorkshire

IN the U.K., at Goldthorpe Colliery, near Doncaster, Yorkshire, the Cementation Co. Ltd. advanced the Bella drift by 63 yds. during the week ending October 28, 1956, a rate of progress believed to be a record for this class of work.

This tunnel, which is being driven from the surface through coal-measure shales and sandstones, dips at 1 in 8.9 and is supported by steel arches 12 ft. high by 16 ft. wide set at 2 ft. 6½ in. centres. For drilling five Atlas-Copco 656/4 wet-type machines were used, and loading was carried out by an Eimco 40H loader. Water inflow caused much difficulty throughout the driving of the drift, and during the week referred to as much as 4,997,000 gal. were pumped out, a series of Sykes Universal pumps being used.

The tunnel was advanced during the period beginning at 10.30 p.m. on October 21, and ending at the same time on October 28. A total of 64 yds. was driven during the week, with 62 yds. completed. The agreed average for the week was thus 63 yds.

R 12 arches were used as supports. These were in three sections, 5 in. x 4½ in., 12 ft. high and 16 ft. wide set at 2 ft. 6½ in. centres and with 3 ft. 6 in. centres for refuge holes. The supports were covered by corrugated sheets to the spring of the arch. Twenty concrete lagging slabs and six angle spaces were sited between each setting.

An average of 22.5 cu. yd. of spoil was excavated per yard of face advance. During the week, some 1,417.5

An Eimco loader in tunnelling operations



An Atlas Copco RH 656 drill as used at the Bella drift

cu. yds. spoil was removed in advancing the 63 yds. completed. An average of 8.85 cu. yds. was achieved per man shift, and average mucking time was 1.8 hrs.

The explosive used was Gelamex with ¼ sec. delay detonators, consumption being 3,674 lbs. including that used for clearing refuge holes. This worked out at 58 lbs. of explosive consumption per yard of advance. An average of 50 shots were fired per round, average boring time was 42 minutes, and 34 rounds were completed, with one round partially completed. The mean pull was 5.49 ft. Blasting was accomplished by the burn cut method and stemming was by means of sand filled paper bags.

One Eimco 40 H loader was used, and five rotary percussive C.A. drills of the Atlas Copco 656/4 W. Wet Boring type were used, mounted on air legs.

A total of 160 shifts, each of 8 hours duration, were worked at the face. Two shifts worked comprised eight men and one shift seven men. The working personnel comprised:

Back-crew labourers	.. .. (12 hr. sh.)	25
Electricians	.. .. ..	14
Fitters	.. .. ..	14
Pump-men	.. .. ..	28
Compressor Attendants	.. .. ..	13
Plate-layers	.. .. ..	7
Main Haulage	.. .. ..	14
Secondary Haulage	.. .. ..	14
Banksmen (tipping, loading, etc.)	.. .. ..	14
Dumper Drivers	.. .. ..	14
Supervision and Firing (N.C.B.)	(8 hr. sh.)	21
Supervision — Cementation Co., underground	.. .. (12 hr. sh.)	14
Supervision—Surface and Back crews	.. .. ..	7

Cutter Loaders at U.K. Collieries

THE Dosco Miner has been used in the mines of Nova Scotia since 1950, and extremely successful trials have been in progress in this country at Rawdon Colliery, on the very hard Stockings seam, since 1954. The manufacturers state that a total of 30 machines were working in 1955.

Designed to work in seams over 5ft. 6in., the Dosco Miner has a maximum cutting height of 7 ft. 6 in. but thicker seams can be worked if the top coal parts readily from the roof. The rate of cutting depends upon the coal hardness, and to some extent the gradient. In adverse circumstances 25 yds. an hour can be expected whilst 35 yds. may be obtained in good conditions. A 5 ft. buttock is carried by the cutting head.

The machine can either flit back along the face at 38 ft. per min. on completing its run, or be turned round. Flitting takes about 1½ hours. It appears, therefore, that if a cycle of operations is to be completed in a shift the face length must lie between 120 and 160 yds. according to the actual length of the shift at the coal face. It is possible to take two cuts in 24 hours and an output of from 720 to 960 tons per 24 hours can theoretically be expected from two cuts on a 5 ft. 6 in. seam, with a face advance of 10 ft. per day. Alternatively, a longer face can be worked with cutting taking place on two shifts.

The main dimensions of the machine are: Length, 17 ft. 9 in., height, 3 ft. 9 in., width, 4 ft. 6 in., with a weight of 17 tons.

The main frame is mounted on caterpillar tracks and carries two 75 h.p. water-cooled electric motors which power the cutting chains and a 50 h.p. water-cooled motor to work the hydraulic system. The caterpillar tracks are worked hydraulically, as are the cross conveyor, jib lifting and jib advancing mechanisms, the last three items being carried in a sliding section fitted on "Tee" slides in the main frame. The cutting head carries seven ball joint cutting chains which give a cutting width of 4 ft. 10 in. at the nose but narrow to 3 ft. 2 in. between the gearboxes. Water sprays are provided for dust suppression.

The following article continues our description of the machines used for cutter loading at collieries of the United Kingdom.

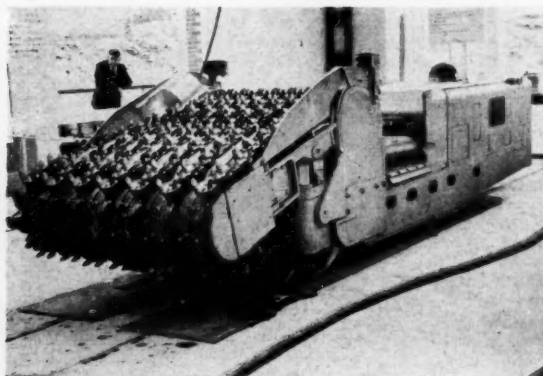
In action, the cutting head is pushed forward 18 in. into the base of the seam by the hydraulic cylinders and the jib is then lifted hydraulically to roof level by a further set of cylinders. The cutting operation is completed by retracting the jib 18 in., lowering it to the floor and advancing the machine on its tracks ready for the next cut. The pick speed is 740 ft. per min. and the coal is carried back to the cross-conveyor behind the cutting jib on the chains. Both top loading belt conveyors and armoured chain types have been used with this machine but the latter with a high goaf side spill plate is to be preferred. This should run in the direction of cutting so that any coal which may be spilt from it on the face side will be picked up and re-loaded by the machine.

In steep measures, downhill cutting by the machine is necessary and in all cases desirable. Gradients up to 1 in 3 can be worked without assistance, or steeper if a winch is provided to assist in flitting. In steep seams, therefore, cutting will take place in one direction only, also on short faces in flat seams, whilst on long faces it may be more expedient to turn the machine and cut in both directions.

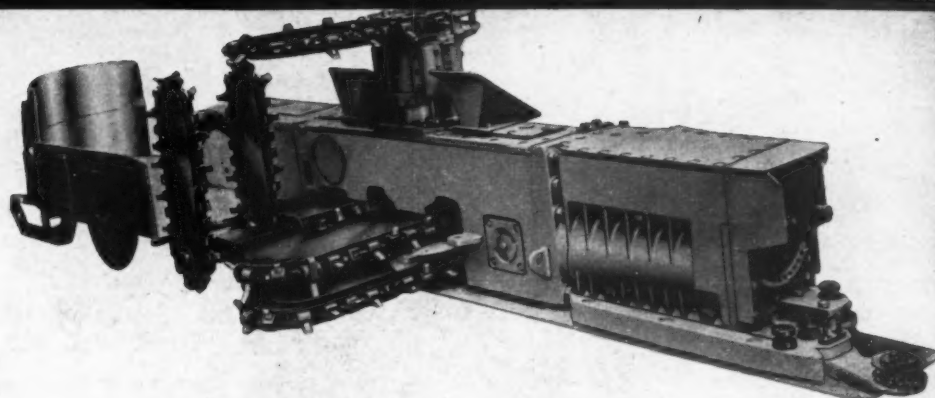
By J. M. CAW

A particularly useful feature is that any desired thickness of roof coal can be left by adjusting the cutting height reached by the jib. The roof can be well supported by using hinged bars, as was done at Rawdon Colliery, the only exposed roof being a portion about 17 ft. by 7 ft. over the machine itself. If the machine is operating this can be supported within 15 minutes of exposure, and temporary supports can be set for the machine driver if necessary.

At Rawdon Colliery on the tough and woody Stockings seam a 110 yd. face dipping at 1 in 8 in favour of the machine has been worked. The seam width was 8 ft. and 7 ft. was cut by the machine. In order to take a 5 ft. web off the face by conventional cutting, shot-firing and hand filling on to belt conveyors 49 men were required. After the Dosco Miner had been installed it was possible to reduce the number of men required to 28 and a face O.M.S. of 12.7 tons was obtained. The face wage costs were re-



MECHANICAL CUTTING AND LOADING IN COLLIERIES—VI



duced from 10s. 6d. to 4s. 10d. per ton the extra cost of depreciation, maintenance etc., being 1s. 8d. per ton. A disadvantage of the machine is that, in common with other machines of this type it produces a good deal of small coal.

Results obtained from double shift working during the month of December, 1955, at Rawdon Colliery are given in the following table:

Week Dates	Output tons	Face man shifts worked	Face O.M.S. tons	Machine shifts worked
4-10	4,245	354	11.99	11
11-17	4,233	347	12.20	11
18-24	3,851	313	12.30	10
25-31	2,604	230	11.32	7

Average tonnage per machine was 383. In the last week noted only four days were worked. To facilitate maintenance two built-in hydraulic jacks are provided to raise the rear end of the machine.

The Gloster Getter, which winches itself along between the conveyor and the face, is capable of getting really hard coal from seams in a width range of 2 ft. 8 in. to 4 ft. 8 in. The prototype was first tried at the Holmewood colliery in the East Midlands No. 1 area, six years ago. Experience gained here left its mark on the design of later models.

In the current Mark 4 model, it can be seen that two horizontal jibs are mounted to cut at the base of the seam with a third jib mounted on an adjustable turret, and twin shear jibs which make sure of a sizeable product. Gummings are passed through the body of the machine and mechanically loaded whilst the lump coal is deflected on to the conveyor by a curved chute, which is attached at the rear. The curved chute successfully eliminated early troubles experienced with the original straight chute.

The main dimensions of the Mark 4 Gloster Getter are: length—13 ft. 0 in.; width—1 ft. 3½ in.; and height—2 ft. 3½ in. It is built in 3 sections consisting of 62 h.p. motor, central cutting unit, and traction assembly. Cutting can take place in either direction, but the shear jibs and chute must be changed over to the alternative positions provided for the return journey. This takes between 30 and 60 minutes, and can be done while the conveyor is being snaked over and supports advanced.

At Bolsover Colliery, East Midlands Division, where considerable development work was done, chamfering off the stable holes was found to facilitate entry of the machine at the face termini.¹⁵ The stable holes were carried 20 ft. wide and 7 ft 6 in. in advance of the face. The machine can advance at any of 7 speeds between zero and 6 ft. per min., and at Bolsover, on a seam 3 ft. 6 in. thick and 100 yds. long (including stable holes), it was estimated that

two cuts of 2 ft. 6 in. depth could be taken each shift, giving an output of 180 tons with an O.M.S. of 8/9 tons (540 tons per day).

In order to provide close support at the face, a cantilever system of corrugated roof bars was adopted which could be swung parallel to the face to clear the turret mounting the top jib.¹⁶

During 1954, seventeen Gloster Getters were in use, producing 569,200 tons at an average face O.M.S. of 5.26 tons. The best face O.M.S. was over 6 tons, and one machine produced 2,270 tons per week over a 3 month period. The output per shift, however, was generally of the order of 100 tons.

An average team consists of about 21 men. Results published by the manufacturers obtained on various faces are given in the table below.

Colliery Unit	Total face length (yds.)	J.G.G. cuts (yds.)	Height cut	Shifts per day	Average length per shift (yds.)	Cuts per day	Saleable Coal (tons)		O.M.S. ¹⁷ (tons)	
							Shift	Day	Shift	Day
Cresswell Double 43s	310	290	3' 1½"	2	290	2	220	440	6.32	7.26
Cresswell Single 6s	117	107	3' 10"	2	175	3	151	302	6.38	7.24
Langwith Single 90s	112	98	2' 8"	3	171	5½	102	306	4.59	5.05
Chanters Single	150	130	3' 9"	2	130	2	140	280	5.9	6.7
Crigglestone Single	130	118	3' 0"	2	118	2	95	190	4.7	5.4

To date, some 60 Mark 4 Gloster Getters have been sold in the British coalfields. It is normal practice to use small shortwall cutters such as the Joy-Sullivan 5-B5 model, in combination with this machine. Additional mechanization of main headings and face gate headings can also be adopted with advantage, as has been done at Bolsover where 12 x 7 ft. main headings have been advanced by three men at the rate of 50 yds. per week using an A.B. arc wall coal-cutter, mounted on caterpillars, M.C.2 Joy loader chain conveyor and drilling machine. For the face gate headings, the loader is dispensed with, and a crew of three obtains advances of 30 yds. per week.

In view of the rapid turn round of this machine, it may be considered non-cyclic in operation. Close-up support to the face is possible, owing to the narrow width of the machine, only 18 in. being required to be left between the face conveyor and the face.

REFERENCES

- (15) The Bolsover Story, N.C.B. publication.
- (16) N.C.B. Information Bulletin 55/137. The Gloster Getter.

On the opposite page the Dosco Miner is shown at extreme left, with beside it an illustration of the machine in service underground. Above, on this page, the Gloster Getter Cutter Loader, Mark 4 model

Machinery and Equipment

Preventing Conveyor Accidents in Mines

Serious accidents have occurred when tensioning the chains on armoured coal conveyors. To overcome this danger and prevent the accidents, A. G. Wild and Co. Ltd. have developed a new method which is completely safe.

The equipment comprises two 10,000 lb. capacity Brettell Hydraulic Pullers, each complete with a pair of brackets and a length of high tensile chain, one pulley and one pair of brackets being required for each conveyor chain. The equipment is applied on top of the conveyor rails at either side of the conveyor. The brackets each carry a dog for engagement with the conveyor chain, one of the pair having a horn for engagement with the eye end of the Puller, the other carrying the short length of chain for engagement with the claw at the piston rod end of the Puller.

In application, each pair of brackets is applied to the conveyor chain by means of the dogs and at a distance of 6 ft. to 7 ft. apart, with the horn on one bracket facing the short chain on the other. The Puller is placed on the rail with the eye end over the horned bracket and after extension of the piston rod, the claw it carries is engaged with the appropriate link of the short chain on the other bracket. The conveyor chain can then be tensioned as required by operating the Hydraulic Pullers. There is no fear of slipping and the load can be held indefinitely without movement whilst surplus links are being removed from the conveyor chain.

GROUT-HOLE DRILLING WITH LIGHTWEIGHT DRILL

What must be considered an outstanding performance for a one-man operated drill was recently achieved at the North of Scotland Hydro Electric Board's Lower Moriston project. Duncan Logan (Contractors) Ltd., report that they have drilled several grout holes to a depth of over 300 ft. using a lightweight rock drill.

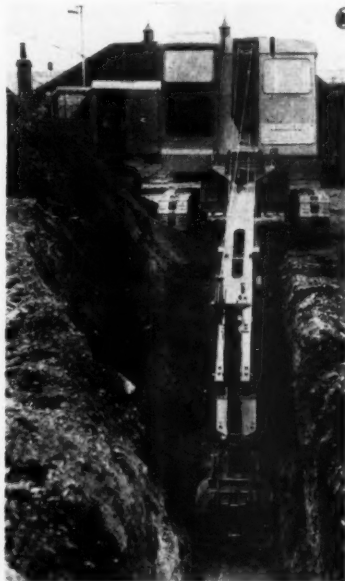
It has been found necessary to drill in the rock at the upstream face of the dam, a large number of grout holes using Atlas Copco deep hole small bore drills (type RH657). In the early stages various depths were drilled up to 200 ft. but as work progressed it was found necessary to go down to a depth of 300 ft. This was achieved without difficulty with an air pressure of 85 p.s.i.

This achievement is all the more remarkable considering the weight of drill steel involved. For removing the steels from the hole the driller has three helpers as at 300 ft. the total weight is about 5½ cwt. Sandvik Coromant drill steels (in multiples of 16 ft.) with tungsten carbide tips are used for this work. The method used is stage grouting. Drilling time for a 300 ft. hole varied between 28 and 36 hours, depending upon the type of rock encountered. A complete cycle of operation for grouting one hole 300 ft. deep drilling inject-

ing cement grout, time for cement grout to set etc. takes approximately one week.

A FOUR-PURPOSE EXCAVATOR

A new excavator is now being manufactured by Ransomes and Rapier Ltd. Named the Rapier 414, the machine is a ¾ cu. yd. excavator, with four-purpose front end equipment for shovel, drag-shovel, skimmer and crane. This equipment can be changed round in the field in less than an hour, it is reported, while with long boom equipment the excavator operates as dragline, grab or crane.



The Rapier 414 Excavator with the four-purpose equipment, arranged as a dragshovel

The power unit is a Perkins diesel incorporating a fluid drive coupling in the engine bell casting. The unit, which offers obvious scope as a tool for mine dump, small surface or quarry operation, is the newest of the Rapier range. It was displayed at the Public Works Exhibition.

A NEW PORTABLE COMPRESSOR

The D30A portable air compressor is an addition to the range of these units manufactured by The Climax Rock Drill and Engineering Works Ltd.

The D30A is a two-tool compressor of new design, with a free air delivery of 120 cu. ft. min. at 100 lb. per sq. in. The standard power unit is the Ford 563E industrial water-cooled diesel engine,

which provides an adequate reserve of power.

The clutch plates can be renewed or inspected without moving either the engine or the compressor unit. A detachable sump door provides access to the submerged, positive-type oil pump unit, which can be removed quickly and easily, while the simple removal of a few nuts on the cylinder head enables the valve units to be inspected and maintained.

A simple, hand-operated plate-type clutch transmits the drive to the two-stage compressor unit—a robust, efficiently-cooled unit which delivers the compressed air at an unusually low temperature.

A NEW POWER PACK

A new stage-by-stage power pack—an industrial version of the R6 Mark 2 diesel engine—is being manufactured by F. Perkins Ltd. The R6 (1) Mark 2 Power Pack is on similar lines to the smaller, popular Perkins L4 (1) stage-by-stage power pack.

The new power pack has a six-cylinder pedestal mounted diesel engine rated in accordance with BS 649/1949 to give 67 b.h.p. at 1,800 r.p.m. (gross). The engine has a 4 in. bore, 4½ in. stroke and a swept volume of 340 cu. in. (5.56 litres).

The attractively designed R6 (1) diesel power pack is complete with 15 gal. fuel tank, filters, fitted instrument panel, 24 v. electrics, tropical radiator and oil cooler. It is enclosed by a radiator cowl, top canopy and removable side panels are optional.

Other features include a heavy-duty air cleaner, water thermometer and tachometer, 11½ in. Rockford clutch, silencer, thermostat, front and rear lifting brackets and a 20 in. dia. fan. Equipment also includes a fuel lift pump and primary fuel filter, starting handle, industrial tools and spares.

The recently introduced R6 Mark 2 diesel engine embodies a number of modifications and design improvements to give better performance and longer life, with consequent increased economy for operators in this country and overseas.

PROTECTIVE RUBBER BOOTS

A new British Standard (B.S. 2781: 1956), has been primarily prepared at the request of the Ministry of Defence to provide for protective boots for fire-fighters. The special qualities of the boots, however, make them suitable for wear by quarry workers and others engaged on work which calls for protective footwear with characteristics such as those set by this new standard. These boots do not offer protection against electric shock.

B.S. 2781 specifies requirements for materials, design, manufacture and marking. Four methods of test are specified in appendices. An outline of the B.S.I.'s Certification Marks scheme is given in the Standard. Copies of the Standard

**The Chaseside Rock Mover,
the surface version of the
Mining Wagon**

may be obtained from the British Standards Institution, Sales Branch, 2 Park Street, London, W.1. Price 3s.

FUEL ADDITIVES CUT COSTS

Two fuel additives which will substantially reduce fuel costs are among the group of new products now being manufactured and marketed by the Amber Industrial Chemical Treatments Division of Amber Pharmaceuticals, Ltd. In addition to reducing costs, these products also have qualities for the lessening of air pollution caused by incomplete combustion. The products, one for coal and solid fuels and one for diesel fuel oils, are designed to ensure complete combustion of the fuel, thus eliminating slag in one case and desulphurising residual oils in the other.

The combustion accelerator for solid fuels enables a high degree of thermal efficiency to be obtained when using the comparatively low grades of coal commonly forced upon industrial concerns. The resulting economies in fuel supplies and waste disposal should make a valuable contribution towards cost stabilization. This facet is of particular interest when consideration is brought to bear upon such mining fields as the Northern Rhodesian Copperbelt, linked as this area is in the mind with Wankie coal supply, the cutting and burning of brushwood as a stopgap fuel, and the final solution of Kariba.

The second fuel additive for liquid fuels has certain properties which will interest users of fuel oils and those concerned with preventing air pollution.

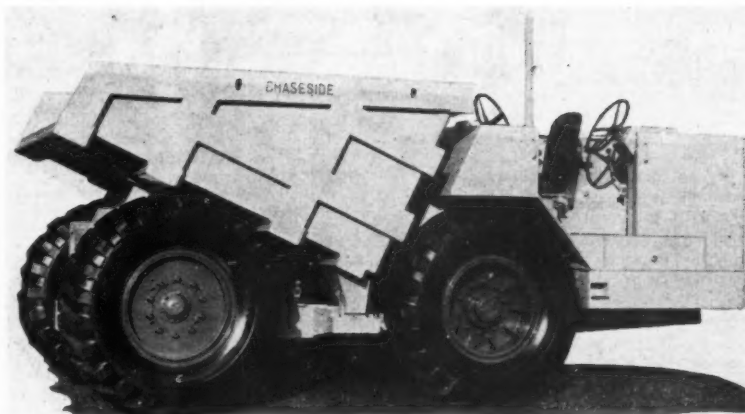
A RANGE OF MINING PUMPS

A new brochure has lately been produced by Megator Pumps and Compressors Ltd., covering the manufacturers range of Type M snore pumps for face drainage, dust suppression and wet cutting, and of the larger Type G.H. pumps with capacities up to 160 g.p.m. and heads up to 350 ft.

The Megator sliding shoe principle provides good suction and self-priming powers. These powers are inherent in the design of the pump, and do not require any by-pass or other priming device. The capacity of these pumps is substantially constant over the full range of working heads, the rated output thus being maintained despite changed surrounding conditions. For the rest, mechanism is simple, self-compensation for wear is maintained, and the pumps are easily maintained.

The Type M snore pumps have capacities up to 50 g.p.m. with heads up to 150 ft. These pumps will deal continuously with any inflow from a small seepage to full capacity. They will operate with long suction pipes and do not have to be moved frequently as the face advances. Standard sets are direct coupled to Buxton certified flameproof motors.

The M16 model has a capacity of



17 g.p.m. with a maximum suction lift of 25 ft. The M50 model has a capacity of 50 g.p.m. and a maximum suction lift of 23 ft.

The GH 3 and GH 4 pumps were developed from the M snore pumps to provide for greater heads and capacities, particularly for intermediate service and for pumping between levels in horizon mining. Based on the same sliding shoe principle, the GH range has the same characteristic suction and self priming powers.

The GH 3 model has a capacity of 80 g.p.m. and a maximum suction lift of 20 ft. The GH 4 has a capacity of 160 g.p.m. and a maximum suction lift of 20 ft.

**TRACKLESS UNDERGROUND
MINING WAGON**

In recent months increasing numbers of Chaseside dumpers have been modified for use underground in trackless mining operations mainly overseas in Sweden and Canada.

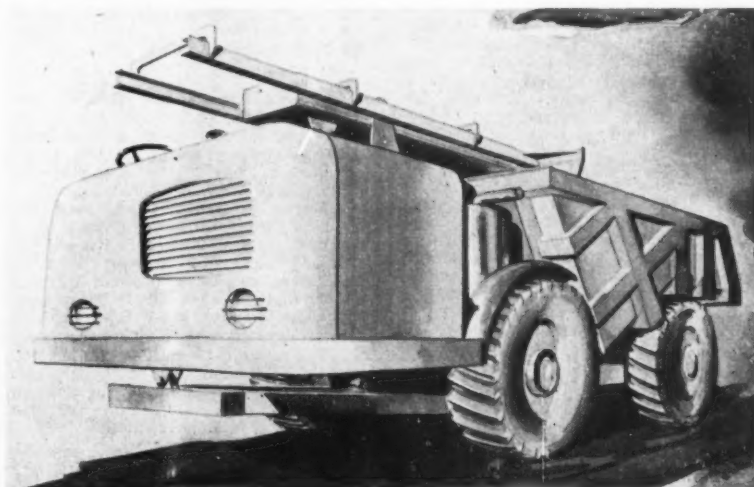
The distinct trend towards this type of mining has caused Chaseside Engineering Co. Ltd. to investigate the ideal requirements of a dumper for underground use in collaboration with several of Canada's best known mining companies. The result of these investigations can now be seen

in the form of the new Chaseside Mining Wagon.

The new mining wagon, a number of which were already ordered at the drawing board stage, has a pay load of 17,500 lbs. and a heaped hopper capacity of 7.6 cu. yds. The wagon is comprised of two major units, the traction unit and the load carrying unit, each on one axle. When linked all four wheels have constant ground contact. Ground clearance is 9 in. when fully loaded. The wagon is powered by a four-cylinder diesel fitted with a high efficiency exhaust gas conditioner. The transmission system and gear box give five speeds up to 15½ m.p.h. in either direction.

The wagon has fully power-assisted steering with duplicate steering control for driving in both directions. All the steering mechanism is fully protected. A scraper attachment is optional. It enables more positive loading to be carried out by small overhead loaders. The scraper hopper and steering are operated by a powerful hydraulic system with fully enclosed circuits. Two large area, cam-operated brakes act on the driving axle to give excellent trouble-free braking.

The wagon is constructed from ½ in. and ¾ in. steel plate. According to the manufacturers, a modified version with larger wheels and a more powerful engine is for use above ground.



**Artist's impression of the
Chaseside Mining Wagon**

MINING MISCELLANY

Mineral exports from Cyprus in the first nine months of 1956 were valued at over £10,000,000, compared with £8,000,000 for the whole of 1955.

★

The discovery of a commercially exploitable uranium deposit has been reported from France. The find was made near Malville, between Nantes and St. Nazaire, after three months' prospecting.

★

Shaw River Alluvials, Ltd., has secured an option over a zircon and rutile-bearing area of 8,000 acres near Kempsey, New South Wales. The company will operate the area in partnership with Oxide Rutile, N.L., each company to share equally in capital and profits.

★

Plans to build a new \$12,000,000 drill manufacturing plant near Richmond, Indiana, have been announced by the Bucyrus-Erie company. Completion is scheduled for late 1957 or early 1958. Machines to be manufactured at the new plant include water well drills, shallow oil well drills and blast hole drills.

★

A new Canadian mining company, Minerals Development Corporation, has started a \$1,000,000 initial survey of County Mayo and County Galway. A five man team, led by Professor Noel Odell, a Cambridge University geologist, is surveying abandoned copper, lead and other mines in West Ireland. At Mace and at Murvey, County Galway, traces of molybdenite have been discovered.

★

In a Parliamentary reply concerning government strategic stocks, Mr. Peter Thorneycroft, President of the U.K. Board of Trade, made the following statement: "With regard to the stock position, we always study the question of the proper level of strategic stocks in the light of developing circumstances, but I have no alteration in policy to announce".

★

A preliminary map of the Granduc Area has been published by the British Columbia Department of Mines. It is reported that in the Granduc deposits 25,600,000 tons of ore averaging 1.62 per cent copper have been indicated by surface diamond drilling and underground drilling from two adits. Extensive development work is proceeding.

★

Quebec Lithium's recently enlarged mill is now operating at the new capacity rate of 1,000 tons per day. Plans have been finalized by the company for the production of feldspar as a by-product of spodumene operations. New magnetic units will permit production of 400-500 daily of a high quality feldspar from the treatment of 1,000 tons per day of the lithium ore.

★

Efforts are being made by the local Development Association in Letterkenny, County Donegal, Eire, to have old lead, zinc and silver mines re-opened in the district. Two different mines, which were in operation less than 80 years ago, are involved. A recent analysis from the

old deposits is reported to have shown "very favourable results". The Association plans to bring mining experts from Avoca and elsewhere to assess the deposits in question.

★

India has accepted a Soviet offer of 500,000,000 roubles long-term credit to ease her foreign exchange deficit position. The money will be used to purchase machinery from the Soviet Union for various development projects associated with coal mining, oil refineries and steel. The Soviet Union has already given India a 550,000,000 rupee long-term credit for building a 1,000,000-ton steel plant at Bailal. India has also entered into an agreement to purchase 1,000,000 tons of Russian steel during the next three years, at a cost of 650,000,000 rupees. The Soviet Union will use the rupees to buy Indian goods.

★

The Le-Tourneau-Westinghouse company is building a new factory at Peoria, U.S., as part of a \$9,000,000 building and tooling programme. The new 300,000 sq. ft. building will adjoin the present site of one of the company's Peoria plants. Cost of the building and tooling will exceed \$6,000,000. The factory will contain complete manufacturing facilities for processing Tournapull prime movers and will increase the company's productive capacity at Peoria by more than 150 per cent. The company is also expanding its plant operations at Toccoa, Ga., and at Indianapolis.

★

Arrangements have been made with Alan Muntz and Co., under which the Pescara free piston engine system will be manufactured by the National Gas and Oil Engine Company, a member of the Brush group. Gas generators with cylinder diameters of 6 in. and upwards are covered by these agreements and production will be undertaken at the Ashton-under-Lyne works of the National Gas and Oil Engine Co. Ltd. One size of free piston gas generator will be produced at present—this is the model G534 developed by S.I.G.M.A. in France, which can provide 1,000 s.h.p. in a single unit and up to 16,000 s.h.p. by the use of multiple units.

★

The Eire Minister for Industry and Commerce, Mr. Norton, stated in Parliament that he had given a conditional undertaking to grant prospecting facilities to a company which proposed to carry out minerals exploration in the Skibereen-Ballydehob-Crookhaven districts of West Cork. Replying to a question, he said that he had urged the company concerned to start work in these areas as soon as possible, but was unable to state when they would begin. The local Member, Mr. P. Murphy, said his information was that the company did not propose to start operations for another 12 months and he thought this was most undesirable in view of what he termed "strong competition for the mining rights in these districts."

★

Lord John Hope, Under-Secretary for Commonwealth Relations, stated in the

House of Commons that rights to prospect for, and mine, diamonds in Basutoland had been granted by the Paramount Chief of Basutoland to Mr. John Scott, to operate from April, 1955. In return the grantee had agreed to make various payments, the principal ones being £200 a month to the Basutoland National Treasury, for the first three years of the agreement, 50 per cent of the realized profits of any diamond pipe found, and a royalty of up to 10 per cent on all diamonds found. No concessions have been granted in Basutoland for the exploitation of uranium, nor has any concession for the exploitation of iron ore in Swaziland been granted.

★

The Pakistan Planning Board has recommended the expenditure of Rs.475,000,000 for the development of fuel and mineral resources during the period of the Five Year Plan. Special emphasis is laid on the development of gas and oil resources in order to conserve foreign exchange. It is proposed to spend about Rs.418,000,000 on prospecting for oil and gas, of which Rs.362,000,000 will come from the private sector. The Board suggests that, as a first step, a Bureau of Mines should immediately be set up to train the necessary staff. Coal production is to be increased during the five-year period by another 500,000 tons. For this purpose the Government will invest Rs.19,000,000. The board has included Rs.600,000 for intensified prospecting and survey of lignite deposits. It is proposed that chromite production should be raised by 40 per cent. A hundred per cent increase in gypsum production is also planned.

★

A Czechoslovakian geologist, Mr. Václav Mach, has arrived in Ceylon to make a detailed study of the island's mineral resources. He will examine the ilmenite-bearing sands at Pulmodai and also lime deposits in Puttalam and Ambalangoda on the west coast. The Minister of industries, Mr. P. H. William de Silva, arranged to have the advice of this specialist before starting work on the ilmenite refinery at Pulmodai and on a second cement factory. Another Czech geologist, as well as a surveyor and a designer, will be arriving shortly in Ceylon to assist Mr. Mach. Their services have been made available under the recently-signed Economic Co-operation Agreement between the Governments of Ceylon and Czechoslovakia.

★

African Explosives and Chemical Industries (Rhodesia) Ltd., which has bought out Dorowa Minerals Ltd., and has thus taken over some of the richest phosphate claims in Africa, may be in production on these Sabi Valley claims by the end of next year. The claims which were discovered by Mr. F. P. Mennell, of Bulawayo, are about 40 miles from Inyazura. On October 29 they were described by Mr. K. W. Spilhaus, managing director of African Explosives, as "better than the Eastern Transvaal ones." The Eastern Transvaal phosphate claims are being worked by the South African Government, which is believed to have spent £1,500,000 on their development. It is understood that, once certain technical difficulties regard-

ing the development of the Dorowa deposits have been overcome, African Explosives will be in a position to supply the Federation for many years to come. At present all superphosphates for the Federation's fertilisers are imported from the Union of South Africa and overseas. African Explosives is now building a superphosphate factory near Salisbury at a cost of £3,500,000. For the first few years supplies of phosphate rock will be imported from Morocco, but it is hoped eventually to switch to Dorowa.

The regulations governing concessions for radioactive minerals in Pakistan were the subject of a recent statement by the Ministry of Industries. Grants of concessions are governed by the Pakistan Mining Concession Rules, 1949, according to which an interested party must first apply for a Certificate of Approval to the Director of Mineral Concessions, Karachi. When this certificate has been granted, he can apply for a prospecting licence or a mining lease. Discoveries of minerals containing any radioactive element must be reported to the director, Mineral Concessions, and the chairman, Atomic Energy Commission. The Central Government must be given the first option to purchase the mineral produced. Rewards ranging from Rs.50 to Rs.500 for radioactive sands and from Rs.1,000 up to Rs. 10,000 for workable radioactive minerals are offered by the government, the amount depending on the importance, richness and extent of the deposit. Rewards varying from Rs.200 to Rs.500 are offered for radioactive minerals not concentrated enough to be economically workable, but which might give a clue to other workable deposits in the neighbourhood.

Our issue of October 26 carried the news item in these columns that the Vihanti Lead and zinc mine in Finland had shipped a maiden tonnage of lead in August last to Western Germany, totalling 500 tons. We now understand that the company's maiden shipment was in September when 952 tons were shipped to Belgium.

Orders valued at approximately £200,000 for 330,000-volt cables to be used in the Kariba hydro-electric scheme have been received by British Insulated Callender's Cables from the Federal Power Board of Rhodesia and Nyasaland.

PERSONAL

Mr. St. J. R. C. Shepherd has been re-elected president of the Mining Club for the coming year.

Mackay and Schnellmann have opened an office in Tehran. D. Simmons, A.R.S.M., B.Sc., and W. Yuill, B.Sc. (Glasgow) are stationed there for this purpose.

Mr. C. E. Harper and Mr. N. C. Weaver have been appointed directors of the Bolivian and General Tin Trust in place of Mr. P. Phillips and Mr. A. J. Ray Whiteway, who have resigned.

Mr. L. R. Milligan has been invited to accept the post of Industrial Relations Director of the Scottish Divisional Board of the National Coal Board in succession to Mr. J. Barbour, who retired in

August. Mr. Milligan, who is Area General Manager of the Lothians Area, has agreed to secondment from his present duties in order to take up the post.

Mr. H. F. Bibby, formerly manager, American Division of the Metropolitan-Vickers Electrical Export Co. Ltd., was appointed assistant general manager of the company on August 12. He was succeeded in his former position by Mr. C. H. de Nordwall, who retains his seat on the board of Metrovick do Brasil (Electricidade) Ltda.

In 1952 Holman Bros. Ltd. issued one of the first airmail catalogues to be published by a member of the compressed air equipment industry. The latest edition of this publication weighs 2 oz., contains 36 pages, and illustrates 62 different products. Technical details of every machine in each range are included; altogether, 181 machines are dealt with. Since the first edition this airmail catalogue has been published in six languages.

A colour film entitled "Foam Plug" will be shown at a general meeting of the North Staffordshire Institute of Mining Engineers on November 26, 1956. It has been produced by the Safety in Mines Research Establishment of the Ministry of Fuel and Power and deals with the preliminary research into a new method of fighting mine fires. The meeting will be held at 5.30 p.m. in the North Staffs. Technical College, Stoke-on-Trent.

Obituary

JACK SPALDING

We deeply regret to record the death, in a London hospital, of Mr. Jack Spalding.

A graduate of the Royal School of Mines, and winner of the Brough Medal in 1922, Mr. Spalding started his mining career in 1923 as a sampler-surveyor at the Champion Reef mine. After passing his examinations in Alaska he spent three years on the Shabani and Birthday mines, Southern Rhodesia, returning to India in 1931 as underground agent at the Mysore mine and subsequently assistant chief agent at Ooregum. In 1946 he joined John Taylor and Sons. Three years later he was appointed mining adviser to the Tanganyika government, a position which he held until his death. On various occasions he also acted in an advisory capacity for the governments of Kenya and Uganda.

Mr. Spalding had a distinguished military career, serving from 1918-1920 as lieutenant, 278 Seige Battery, R.G.A., and from 1941-1945 as O.C. First Indian H.Y., A.A. Battery, Indian Army. As a Japanese prisoner of war, he suffered severe hardships on the railways.

The author of various publications on mining, Mr. Spalding was East African correspondent of *The Mining Journal* for several years. His best known books are *Deep Mining* and *Mining Tips and Gadgets*.

CONTRACTS AND TENDERS

The following future authorizations have been announced by the International Co-operation Administration (I.C.A.):—

Contract Period	Terminal Delivery Date	Amount (in U.S. dollars)
Vietnam		
Aluminium and Aluminium Base Alloys and Aluminium Products (PA No. 30-691-99-H9-7237)	25/10/56-30/4/57	30/4/57 350,000
Tin and Tin Base Alloys and their Products (PA No. 30-696-99-H9-7241)	25/10/56-30/4/57	31/10/57 100,000
Brass and Bronze and their Products (PA No. 30-693-99-H9-7239)	25/10/56-30/4/57	31/10/57 90,000
Copper and Copper Products (PA No. 30-692-99-H9-7238)	25/10/56-30/4/57	31/10/57 75,000
Zinc and Zinc Alloys and their Products (PA No. 30-697-99-H9-7242)	25/10/56-30/4/57	31/10/57 75,000
Misc. Industrial Non-Ferrous Metals and their Products (PA No. 30-698-99-H9-7243)	30/4/57	31/10/57 30,000
Lead and Lead Base Alloys and their Products (PA No. 30-694-99-H9-7240)	25/10/56-30/4/57	31/10/57 20,000
Korea		
Bituminous Coal (PIO/C No. 89-33-240-5-7004)	30/4/57	10,000,000
Procurement will be carried out through the U.S. Dept. of the Army.		
Indonesia		
Mining Operations Equipment (PIO/C No. 97-21-043-5-60329)	31/3/57	33,500
Procurement will be carried out through the Federal Supply Service, G.S.A.		
Chemical and Chemical Preparations (excluding Alcohol Fertilizers and Fertilizer Materials, Synthetic Rubber and Toilet Preparations)		6,000
Construction, Mining and Conveying Equipment		1,500
Motor Vehicles, Engines and Parts		18,000
Scientific and Professional Instruments, Apparatus and Supplies		8,000

B.O.T. Ref.: E.S.B./28778/56/I.C.A. Telephone enquiries to Chancery 4411, extension 360.

Metals and Minerals

Ferromanganese from Low-Grade Ores

Reference was made in our issue of October 26, 1956 (p. 497) to a \$2,000,000 prototype plant being laid down at Niagara Falls, Ontario, by the Strategic-Udy Metallurgical and Chemical Processes Ltd., a subsidiary of the Strategic Materials Corporation, for the production of ferromanganese from low-grade ore and concentrates. Preliminary operations have now been started at this plant. Dr. Marvin J. Udy, vice-president of the subsidiary company, announced recently that the actual processing of ore would be started on a unit basis by November 20. Barring any equipment failures, it is anticipated that the plant will be operating on a continuous production basis by mid-December. The operating schedule is intended to yield complete design criteria for the proposed production plant to be constructed by the company at Woodstock, New Brunswick.

Dr. Udy stated that 2,500 tons of the company's New Brunswick manganese ore deposits and concentrates, averaging 15-16 per cent manganese and 18-19 per cent iron, were already at the plant site in Ontario and additional quantities of ore and concentrates were en route to the plant for eventual processing. A sink-float plant is already in operation at the company's mine site in New Brunswick and the results obtained to date in concentrating the raw ores have demonstrated the feasibility of this phase of the over-all project.

The actual design engineering for the New Brunswick plant will be started simultaneously with the attainment of production processing at the prototype plant and will be continued throughout the entire programme. The company should thus be in a position to commence construction of the main plant in the spring or early summer of next year.

The results of the prototype operations will be awaited by producers and shippers of high and medium grade manganese ores with an interest which cannot be entirely free from apprehension.

COPPER IN MOTOR CARS

Last week this column discussed the potential market for aluminium and stainless steel in the automotive industries, with special reference to the quantities used by U.S. motor car manufacturers in their 1957 models.

Copper, brass and bronze are also vital components of America's 1957 automobiles. The November automotive issue of the Copper and Brass Research Association's *Bulletin* points out that copper goes into such key parts as brake cylinders, camshafts, carburetors, crankshafts, chassis and body wiring, distributors, engine bushings and bearings, steering gear, tyre valve stems, shock absorbers and radiators. Copper and brass are also found in motor car clocks, radios and heaters.

The quantities of copper and its alloys used per vehicle range from 42 lb. in the case of Willys Motors' jeeps to 53.7 lb. in a Buick Roadmaster. Chrysler Corporation's Belvedere has an estimated 175 different parts made from copper or one of its alloys. One major maker of motor-car radiators finds copper and brass unbeatable for his products. He especially extols their superior heat-transfer qualities and high strength.

ALUMINIUM IN YUGOSLAVIA

Yugoslavia is reported to have taken additional steps in a programme aimed to make her the world's second largest exporter of aluminium. Yugoslav capacity with three plants is rated at 20,000 tons. This is to be increased by 50,000 tons by the construction of a new smelting works at Montenegro with the aid of a recently negotiated Russian-East Germany loan. It is further reported that Yugoslavia is now negotiating for an additional loan of \$175,000,000 to be used for construction of another aluminium works in Dalmatia, also of 50,000 tons capacity. France has been approached for financial assistance. Long range plans call for Yugoslav capacity of 200,000 tons, of which 30,000 tons would be consumed domestically and the remainder exported.

PYROCHLORE IN RHODESIA

Promising deposits of pyrochlore carbonatites are reported to have been found about 150 miles east of Lusaka in Northern Rhodesia. The Northern Rhodesian Director of Geological Survey is quoted as stating that one of the deposits might be the largest ever known. Pyrochlore is a mineral which contains columbite. The country in which the latest finds have been made lie within the concession owned by Chartered Exploration. New Consolidated Goldfields is an interested party.

ALUMINIUM IN JAPAN

Japanese aluminium refineries have succeeded in reducing their production costs substantially as a result of modernization programmes carried out since 1951. This is stated to be one of the main reasons why the differential between the prices of Japanese and foreign primary aluminium has been reduced almost to nil. Nevertheless plans for production of 65,000 tonnes in 1956 may fall short of the target because of a recurrence of power shortages.

The Japanese smelters and rolling mills are now negotiating with American producers for imported ingot. Sumitomo is asking government approval to bring in more than 5,000 tonnes to be supplied by Alcoa, while Japan Light Metal seeks to obtain 2,000 tonnes from Alcan.

This Asiatic nation, where domestic

demand for aluminium is outstripping capacity to supply, has embarked upon an expansion programme for power and smelting capacity, in order to provide for domestic needs and to become a large exporter. The aim is to increase capacity to 93,000 tonnes by the end of 1958.

★

Domestic production of primary aluminium in the U.S. during the first three-quarters of 1956 amounted to 1,236,650 s.tons, according to the Bureau of Mines. This represents a seven per cent increase over the corresponding period in 1955, despite the loss of an estimated 74,000 tons during the recent strike.

FREE PLATINUM MARKET

The free platinum market in London is reported to be exceedingly quiet and seems to have been little affected by events in the Middle East and in Central Europe. Supplies on the Continent are believed to be fairly plentiful, having been augmented by arrivals of metal from the U.S.S.R., and buying from that quarter is currently at a low ebb. In these circumstances, buyers in the U.K. are not disposed to operate to any marked degree.

In New York, too, world events have had little effect on the platinum market, which has remained firm and unchanged. Leading refiners continued to allocate metal to regular users and outside dealers' offerings were small. Both were holding to the \$103-105 range. Offerings from Europe were not substantial.

ILMENITE AND RUTILE

Mr. K. C. Jacobs, Financial Secretary and Mr. F. R. H. Green, Chief Inspector of Mines, have left Sierra Leone by air for discussions in Britain about rutile mining with the Board of Trade, Ministry of Supply, and the income tax authorities. Their visit is in connection with a proposal by British Titan Products and Columbia-Southern Chemicals (U.S.) to mine large deposits of rutile found in the Imperial chiefdom in the Bonthe district of the country.

It is understood that the demand for rutile in the London market has slackened a good deal, and many users are believed to be covered for some time ahead. Moreover, it is said that a third release of approximately 400 tons of rutile from the government strategic stock is imminent; since this material, in common with past releases, is available only for home consumption, it may tend to restrict U.K. demand on the open market.

★

Japanese industrial interests have offered to buy Ceylon's entire annual output of ilmenite at prevailing market rates. This offer has been sent to the Ministry of Industries. A big Mexican industrial firm, Industrias Quinicas

Besicardo Mexico, has offered to buy ilmenite refined in Ceylon.

According to present plans, 100,000 tons of ilmenite-bearing sands will be refined annually at Pulmodai, near Trincomalee, on the east coast of the island. A Ministry official said recently

that the construction of a road to the Pulmodai site was nearing completion and installation of the refining machinery would be undertaken in about six months. The Ministry has not taken any decision about the Japanese and Mexican offers.

COPPER • TIN • LEAD • ZINC

COPPER PRICES SAG

There was no spectacular movement in the American copper market last week. The big producers and custom smelters are still quoting 36 c. per lb. for the domestic market, but the custom smelters, especially, are not finding a brisk demand. They have, however, been disposing of larger tonnages abroad in recent weeks, otherwise they would probably have been compelled to shade the domestic quotation. The export price has been down to 35 c. and No. 2 scrap copper has slipped to 28½ c. per lb. Demand from brass mills for November is running at only slightly above the October level and December is about the same. It has been suggested that end-year inventory buying should soon appear, but it is difficult to see why this should happen. Certainly because of the general price movement over 1956 there is no tax incentive to pile up copper as there was in 1955 and 1954. On the contrary, the seasonal slackness of Christmas is likely this year to be a more important factor. The U.S. government has added 3,000 tons of new and old unalloyed scrap to the fourth quarter export quota previously set at 6,000 tons.

There is no news of the Rhoanglo-R.S.T. negotiations on pricing Copperbelt metal. Those who have assumed that the negotiations presaged the end of R.S.T.'s fixed price policy have been given something to think about in Sir Ronald Prain's spirited defence of his policy in his annual reports. Meanwhile, although the R.S.T. price was fairly well in line with L.M.E. quotations, until Wednesday's tumble, the re-emergence of a contango has emphasized the possibilities of successful hedging on the Exchange.

International Nickel Company has announced a reduction in its domestic Canadian price to 34½ c. per lb.

The miners at Chuquicamata have accepted their government's request not to cut out Sunday, overtime and holiday working (which would have cut output by 15 per cent). At the same time they have presented 25 demands including a demand for an 80 per cent wage increase. To grant increases of this order would destroy all the work done this year in credit restriction and price and wage stabilization and the government could hardly approve of them.

NO EASIER TIN PRICE IN SIGHT

Tin in the United States has been again under the strain of extraneous influences. The failure of Russia and other countries to send "volunteers" to the Middle East

has been a bearish point but the closure of the Suez Canal and the uncertainty about when clearance will begin or how long it will take is sufficiently important to prevent any marked fall. Meanwhile, a new factor has appeared—the dock strike in New York which put more than 3 c. on the spot New York price for Straits metal which now stands at 112.50 c. per lb. The continuing combination of Suez, a dock strike, and the working of the Texas smelter for another 2½ months could be very serious. Meanwhile, delivery of tinplate is being speeded up, according to reports from the United States, and demand on both domestic and foreign account remains good.

American Can has begun construction work on its new tinplate and steel processing plant which will eliminate the use of precut sheets. The programme will cost \$27,000,000.

Tinplate in Britain is to be released from government control because of recent increases in capacity.

LEAD LOOKS FIRM

The feature of lead trading in the United States has been the consistently good buying by battery makers in spite of the fact that the seasonal peak for battery manufacture has passed. Battery makers started their buying late this year but the continued interest can only reflect the modest pick-up in activity in Detroit. Meanwhile, the European lead price range is pressing fairly hard on the American quotation. Lead could be induced to cross the Atlantic by only a small additional rise in Europe and this move may be encouraged if the American east coast ports are blocked by strikes, though petrol rationing in Europe is a bear point for European lead. Stocks in the United States are not high (about 40,000 tons) and European stocks have been slashed by American barter deals.

EFFECT OF BARTER DEALS ON ZINC

Zinc had an uneventful week market-wise in the United States and the price remained unchanged at 13.50 c. per lb. East St. Louis for prime western grade; demand from galvanizers continues to be adequate and there has been some pick-up from diecasters. However, there were signs that the week marked the beginning of a more active period for zinc.

First, although zinc was consistently soft on the L.M.E. the price is within striking distance of the level at which it could rival the American quotation. Zinc is fairly thin on the ground in Europe because of American barter deals and this is a condition that could be continued and perhaps worsened. Recently-disclosed scandals in the disposal of surplus stocks in the United States to "needy" families—30,000 of a population of 50,000 in one prosperous township have been filling their cars with free groceries—may well strengthen the demand to dispose of surpluses abroad. However, if the oil and shipping shortage become critical and interfere with production in Europe this may markedly reduce the demand for zinc.

Secondly the dock strike may hamper movement of metal, particularly incoming metal. There is every reason to think that the strikers are prepared to fight it out. The latest news is that the National Labour Relation Board is seeking an injunction to restrain the strikers. If this is not effective, it may well be that, with the elections out of the way, the President will not hesitate to invoke the Taft-Hartley Act.

The London Metal Market

(By Our L.M.E. Correspondent)

In the absence of any fresh developments on the political front markets have tended to drift lower, and with both buyers and sellers exercising caution turnovers have been on a small scale. As far as copper is concerned the feeling is fairly general that but for the Middle East crisis prices would be lower, and, taking into account the fully adequate supply position and the uncertainty as to the effect the fuel shortage will have on industrial production, buyers have been reluctant to enter into new engagements, whilst at the same time sellers cannot ignore the possibility that delays will occur in arrivals of metal as a result of steamers being diverted or a shortage of shipping space.

The tin market still remains the most sensitive to the international news, and, with supplies already tight before the Suez Canal crisis, prices have tended to hold up better than in the case of the other metals. Arrivals of tin in Europe via the Cape have resulted in a narrowing of the backwardation to about £20 per ton. There has so far been little indication that the U.S. dock strike has had any effect on the London market, although if the dispute concerning a new wages contract is prolonged it would no doubt aggravate the existing shortage of metal for spot delivery in the New York market. On Thursday morning the Eastern price was equivalent to £841½ per ton c.i.f. Europe.

Lead and zinc prices have reacted from the level reached during the recent rise but in each case the backwardation has been maintained. It might be mentioned that with any surplus offerings of metal being taken off the market against the special stockpiling programme and barter deals in the U.S.A. the reaction to any talk of imports being delayed is inclined to be more sharp. Any further cut-back in motor-car production as a result of petrol rationing in Europe is almost certain to be reflected in the future demand for these metals.

Closing prices and turnovers are given in the table overleaf.

LONDON METAL AND ORE PRICES, NOVEMBER 22, 1956

THE WEEK ON THE L.M.E.

	November 15		November 22	
	Buyers	Sellers	Buyers	Sellers
COPPER				
Cash ..	£281	£281½	£270	£270½
Three months ..	£282½	£283	£271½	£272
Settlement ..	£281½		£270½	
Week's turnover	4,275 tons		5,800 tons	
LEAD				
Current ½ month ..	£120½	£121½	£117½	£117½
Three months ..	£118½	£118½	£116	£116½
Week's turnover	4,325 tons		3,450 tons	
TIN				
Cash ..	£852½	£855	£845	£847½
Three months ..	£825	£827½	£825	£827½
Settlement ..	£855		£847½	
Week's turnover	735 tons		760 tons	
ZINC				
Current ½ month ..	£101½	£101½	£100	£100½
Three months ..	£97½	£97½	£95½	£95½
Week's turnover	3,700 tons		5,550 tons	

METAL PRICES

Aluminium, 99.5%, £198 10s. per ton
Antimony
English (99%) delivered, 10 cwt. and over £210 per ton
Crude (70%) £200 per ton
Ore (60%) bases 23s. 6d./24s. 6d. nom. per unit, c.i.f.
Arsenic, £400 per ton
Bismuth (min. 1 ton lots) 16s. lb. nom.
Cadmium 12s. 0d. lb.
Caesium (99% net), £13 18s. lb. delivered U.K.
Chromium, 7s. 1d. lb.
Cobalt, 21s. lb.
Copper, £270 10s. per ton

ORES AND OXIDES

Bismuth ..	60% 8s. 3d. lb. c.i.f.	30% 5s. 0d. lb. c.i.f.
Chrome Ore—		
Rhodesian Metallurgical (semifriable) 48% ..	£17 8s. 0d. per ton c.i.f.	
Hard Lumpy (45%) ..	£17 8s. 0d. per ton c.i.f.	
Refractory 40% ..	£12 15s. 0d. per ton c.i.f.	
Smalls 42% ..	£15 9s. 0d. per ton c.i.f.	
Baluchistan ..	£18 15s. 0d. per ton c.i.f.	
Columbite, 65% combined oxides, high grade ..	190s./205s. per unit	
Lithium Ore—		
Petalite min. 3½% Li ₂ O ..	£8-£10 per ton f.o.b. Beira	
Lepidolite min. 3½% Li ₂ O ..	£8-£10 per ton f.o.b. Beira	
Amblygonite basis 7% Li ₂ O ..	£35-£40 per ton c.i.f. Beira	
Magnesite, ground calcined ..	£28 0s./£30 0s. 4/d	
Magnesite Raw (ground) ..	£21 0s./£22 0s. d/d	
Molybdenite (85% basis) ..	8s. 5d. nom. per lb. (f.o.b.)	
Titanium Ore—		
Rutile 95/97% TiO ₂ ..	£98 per ton c.i.f. Aust'n	
Ilmenite 52/54% TiO ₂ ..	£11 per ton c.i.f. Malaysian	
Wolfram and Scheelite (65%) ..	229s. 6d./234s. 6d. per unit c.i.f.	
Manganese Ore Indian		
Europe (46%-48%) basis 125s. freight ..	137d. nom. per unit c.i.f.	
Manganese Ore (43%-45%) ..	115d. nom. per unit c.i.f.	
Manganese Ore (38%-40%) ..	110d. nom. per unit (including duty)	
Vanadium—		
Fused oxide 90-95% V ₂ O ₅ ..	£12½-£13½ per unit c.i.f.	
Zircon Sand (Australian) (65-66% ZrO ₂) ..	£20 per ton c.i.f.	
Zirconium Oxide—Calcined Opacifier ..	£325 1-ton, delivered	

Germanium, 99.99%, Ge.kilo lots 3s. 4d. per gram
Gold, 251s. 2½d.
Iridium, £29 31 oz.
Lanthanum (98/99%) 15s. per gram
Lead, £117 15s. per ton
Manganese Metal (96%-98%) £259/£265 according to quantity
Magnesium, 2s. 4d. lb.
Nickel, 99.5% (home trade) £519 per ton
Osmium, £24/27 oz. nom.
Osmiridium, nom.

Palladium, £8 0s./£8 10s. oz.
Platinum U.K. and Empire Refined £34/£35 oz.
Imported £37 15s. nom.
Quicksilver, £83 10s. - £84 10s., ex-warehouse,
Rhodium, £42. oz.
Ruthenium, £15/£17 oz.
Selenium, 112s. nom. per lb.
Silver, 81½d. f.o.z. spot and 80½d. f.d.
Tellurium, 15s./16s. lb.
Tin, £847 10s. per ton
Zinc, £100 5s. per ton

LONDON STOCK EXCHANGE PRICES, NOVEMBER 21, 1956

Finance	Price Nov. 21	+ or - on week	Rand Gold contd.	Price Nov. 21	+ or - on week	Diamonds and Platinum	Price Nov. 21	+ or - on week	Tin (Nigerian and Miscellaneous) contd.	Price Nov. 21	+ or - on week
African & European ..	56/10½	-7½d	W. Rand Consolidated ..	28/1½	-7½d	Anglo American Inv.	8½	-½	Gold & Base Metal ..	1/1½	.....
Anglo-American Corp'n ..	7½	.....	Western Reefs ..	28/3	.....	Casta ..	25/1½	-3d	Jantar Nigeria ..	4/7½	.....
Anglo-French ..	21/9	.....				Cons. Diam. of S.W.A. ..	10/9	.....	Jos Tin Area ..	13/6	.....
Anglo-Transvaal Consol. ..	26/3	.....				De Beers Defd. Regd.	4½	.....	Kaduna Prospectors ..	1/6	.....
Central Mining (£1 shrs.) ..	52/6	-4½d	O.F.S. Gold ..			De Beers Pfd. Regd.	13½	.....	Kaduna Syndicate ..	2/3	.....
Consolidated G'fields ..	59/6	+6d	Freddies ..	7/-	.....	Pots Platinum ..	13/7½	-1½d	London Tin ..	10/-	-3d
Consol. Mines Selection ..	31/10½	+6d	F.S. Goduld ..	76/3	.....	Waterval ..	23/9	-3d	United Tin ..	10½d	.....
East Rand Consols ..	1/9	-1/3	Geoffries ..	3/3	-6d						
General Mining ..	70/-	-7½d	Harmony ..	23/9	-1/6	Copper ..			Silver, Lead, Zinc ..		
H. E. Prop. ..	7/9	+3d	Loraine ..	4/6	-3d	Bancroft ..	45/-	-1/9	Broken Hill South ..	62/6	-6d
Johannes ..	41/3	+3d	Lydenburg Estates ..	13/6	-6d	Chartered ..	68/6	-1/3	Burma Mines ..	3/10½	-1½d
Rand Mines ..	65/-	+7½d	Mariespruit ..	4/6	-1½d	Esperanza ..	2/3	-3d	Consol. Zinc ..	62/9	-1/9
Rand Selection ..	35/7½	+3d	Middle Wits ..	8/-	-3d	Messina ..	8½	.....	Lake George ..	14/3	-6d
Union Corporation ..	36/6	+3d	Ofais ..	51/-	-3d	Nchanga ..	13½	-½	Mount Isa ..	24/9	+9d
Vereeniging Estates ..	5½	+½	President Brand ..	56/3	+7½d	Rhod. Anglo-American ..	5½	-2/9	New Broken Hill ..	45/6	-9d
Wits ..	32/6	+3d	President Steyn ..	31/3	-1/3	Rhod. Katanga ..	42/3	-2/9	North Broken Hill ..	105/-	+5/-
West Wits ..	33/-	+3d	St. Helena ..	26/3	-1/3	Rhodesian Selection ..	43/6	-2/9	Rhodesian Broken Hill ..	11/7½	-4½d
			Welkom ..	15/3	-1/3	Rhokana ..	38	-2½	San Francisco Mines ..	27/3	+6d
			Western Holdings ..	70/7½	+1/3	Rio Tinto ..	81/3	-2/6	Uruwira ..	3/10½	.....
						Roan Antelope ..	24/10½	-1/6			
						Selection Trust ..	4½	.....		
						Tanks ..	7½	.....	Miscellaneous		
						Tharsis Sulphur Br.	6	.....	Base Metals and Coal		
			West African Gold ..						Amal. Collieries of S.A. ..	56/3	+7½d
			Ariston ..	1/5½	+2½d				Associated Manganese ..	36/6	+9d
			Ashanti ..	3/7½	+1½d	Tin (Eastern) ..			Cape Asbestos ..	9/4½	-6d
			Bibiani ..	1/10½	-1½d	Ayer Hitam ..	21/-	.....	C.F. Manganese ..	23/-	-1/9
			Bremang ..	1/3	.....	Gopeng ..	12/7½	.....	Consol. Murchison ..	51/10½	+7½d
			G.C. Main Reef ..	1/6	.....	Hongkong ..	5/7½	-6d	Natal Navigation ..	63/9	+1/3
			Konongo ..	1/4½	.....	Ipoh ..	27/-	-1/-	Turner & Newall ..	95/4½	-2/7½
			Maru ..	2s	.....	Kamunting ..	9/3	.....	Wankie ..	15/9	+4½d
			Taqaah ..	10½d	.....	Kepong Dredging ..	4/9	-4½d	Witbank Colliery ..	5½	+½
			Western Selection ..	7/-	+3d	Kinto Tin Mines ..	19/6	-6d			
						Malayan Dredging ..	14/6	-7½d	Canadian Mines ..		
			Australian Gold ..			Pahang ..	11/7½	-9d	Dome ..	\$26	-½
			Gold Mines of Kalgoorlie ..	13/7½	-4½d	Petalina ..	7/7½	.....	Hollinger ..	\$51	-2½
			Great Boulder Corp. ..	11/7½	-4½d	Rambutan ..	26/-	.....	Hudson Bay Mining ..	\$172	+14
			Lake View & Star ..	16/1½	-1½d	Siamese Tin ..	12/7½	-9d	International Nickel ..	\$196½	-13½
			Mount Morgan ..	17/3	.....	Southern Kinta ..	16/7½	+4½d	Mining Corp'n of Canada ..	£7½	.....
			North Kalgoorlie ..	6/7½	.....	S. Malaya ..	11/1½	.....	Noranda ..	\$111	-7½
			Sons of Gwalla ..	1/9	.....	S. Tronoh ..	6/6	-6d	Queamont ..	£8	-½
			Western Mining ..	10/6	.....	Sungei Kinta ..	17/-	.....	Yakon ..	4/4½	.....
						Tekka Taiping ..	7/4½	-3d			
						Tronoh ..	12/1½	-3d	Oil ..		
			Miscellaneous Gold ..						Apex ..	44/-	-1/-
			Cam & Motor ..	8/3	+1½d	Tin (Nigerian and Miscellaneous) ..			Attcock ..	31/-	-1/6
			Champion Reef ..	12/3	.....				British Petroleum ..	1/7/6	-6/3
			Falcon Mines ..	7/9	.....	Amalgamated Tin ..	10/7½	+4½d	Burmah ..	75/7½	-1/10½
			Globe & Phoenix ..	23/-	.....	Beralit Tin ..	48/6	+9d	Canadian Eagle ..	65/-	-4/6
			Motapa ..	9d	.....	Bisichi ..	4/10½	.....	Mexican Eagle ..	25/1½	+1½d
			Mysoor ..	3/3	.....	British Tin Inv. ..	21/-	-1/-	Shell ..	137/-	-3/7½
			Nundydroop ..	17/1½	.....	Es-Lands Nigeria ..	21½	.....	T.P.D. ..	39/3	-2/-
			St. John d'El Rey ..	48/9	.....	Geovir Tin ..	18/7½	+9d	Ultramar ..	53/-	-3/3
			Zams ..	45/-	.....					

Mining Finance

Time to Buy Coppers?

During the past few months Rhodesian copper shares have lost much of the glamour which surrounded them at the beginning of the year. Mainly responsible for this has been a severe fall in the price of copper from an all-time high of nearly £440 per ton reached last March, to the present level of barely £278. The other most important influence has been a break in Wall Street prices as measured by the *Dow Jones Industrial Index* of some 51 points. Being primarily a "dollar metal" copper has traditionally been hypersensitive to events in the U.S.A. At the present time these cannot be described as being particularly encouraging.

Against such a background, and in view of the statements by Sir Ernest Oppenheimer and Sir Ronald L. Prain to shareholders of Anglo American and R.S.T. Group Copperbelt companies, in respect of financial years ended on June 30, which contained a clear warning that lower metal prices would affect dividends, it was not surprising that copper shares should have shown further weaknesses over the past few days. Extracts from the statements may be found on page 640 of this issue.

Company	Price		Yield	
	High '56	Present	%*	
	s. d.	s. d.		
Bancroft ...	52 3	45 0	—	
Rhoanglo ...	125 6	101 0	8.9	
R.S.T.	58 0	43 4½	8.6	
Rhokana	930 0	38 0	9.2	
Roan	31 3	24 9	12.5	

* After Rhodesian Tax.

We have recently expressed the belief that should prices received for copper average out over the current financial year at £300 a ton, it seemed reasonable to hope—in the absence of unexpectedly large appropriations to reserve—that dividends should not prove unduly vulnerable. But since June 30, nearly five months have passed during which time the metal price has averaged well below £300 a ton. Moreover, the statistical and technical market position indicates that no substantial recovery can be

hoped for until at least a further three months have elapsed. If this forecast is accepted, it would obviously be unwise to rely upon metal prices rising sufficiently during the remaining four months of the year so as to restore the average to the £300 level.

Yet, to base assessments of future share market prices on prospective dividends alone, would be to ignore the possibility of an anticipated or actual recovery in copper prices. The chances for this may be uncertain, but the investor who would care to predict a strike-free Chile or Northern Rhodesia over the next eight months, together with an absence of international crises, would be a brave man. If, in addition, he would be prepared to dismiss the possibility of a strong production revival taking place in the U.S. motor industry, then the time has undoubtedly come for him to liquidate his copper portfolio.

But things are seldom as bad as they appear, and we see little in the present situation to alter our view that good opportunities may soon arise for buying coppers at prices which, besides giving an attractive yield, should in the middle and long-term provide considerable opportunities for capital appreciation.

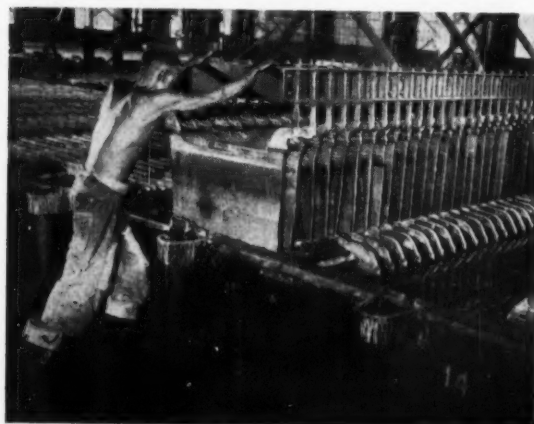
Any appraisal of copper shares must, of course, give due weight to the capital commitments which producing companies have to face over the next few years. Sir Ernest Oppenheimer has estimated that these will amount to the enormous sum of £50,000,000 by the end of 1960. One of the most important constituents of this figure will, of course, be annual instalments which the main

four producers have undertaken to pay towards providing £20,000,000 for the Kariba Hydro-Electric Project. A further £10,000,000 will later be found by way of a surcharge on power supplies. Apart from this, the companies have their own expansion programmes to finance. In the case of Mufulira, output is to be raised by fully 50 per cent, while Rhokana still has a good deal to spend on underground reorganization necessary for maintaining metal output as grade decreases with depth. Bancroft Mines will also require a large sum of money before production is reached next year. While these outlays are likely to be met largely by raising more money from shareholders—as predicted by both R.S.T. and Rho-Anglo—it would be very unwise to assume that substantial appropriations from profits will be unnecessary.

Another question of particular importance is the rising curve of production costs on the Copperbelt. During the past financial year all producing companies were again affected by this adverse trend. Moreover, despite lower royalty and bonus payments which reduced copper prices will bring during the current financial year, no overall reduction in costs may be expected. One of the reasons for this has been the recent increase by over 100 per cent in Rhodesian Railways' transport charges.

Yet there is nothing to suggest that these liabilities and commitments cannot confidently be met. And while the immediate prospect for earnings is less bright than it was at the beginning of the year, there is no doubt that to invest in Northern Rhodesian copper is to back a highly profitable, financially healthy, expanding industry which has substantial growth prospects in the future. Even under present conditions profit margins are high and amount, with a metal price of £280 and costs of £160, to as much as 75 per cent on turnover. While this figure would compare favourably with that in any industry in any part of the world, it could well be increased in the future by the rise in output that the envisaged expansion plans should bring.

At left, dissolved away anodes being removed from cells at the Nkana refinery, and at right, the casting pit at Mufulira Copper Mines Ltd. The conveyor system and inspection aisle are on the left



Copperbelt Results

Roan Antelope's Liquidity.—The consolidated balance sheet of Roan Antelope Copper Mines at June 30, 1956, revealed a total asset position increased to £38,538,038 from £31,988,475 at the end of the previous year. Current assets at £26,705,840 (£22,730,981) exceeded current liabilities by £10,500,000. Trade investments and loans moved up to £4,258,945 from £2,314,147, and fixed assets to £7,567,616 from £6,939,335.

	1955	1956
Mine Output (tons)	5,099,600	5,555,300
Grade (Cu.)	2.16%	2.09%
Cu. Produced (l.tons)	82,696	88,714
Av. Revenue per ton	£271	£337
Av. Cost per ton*	£142	£167
Ore Reserves Tons (000)	90,213	89,287
Grade	3.20%	3.14%

* Delivered buyers.

During the past financial year Roan Antelope made net profits after tax of £8,358,513 compared with £5,922,759 during the previous year. After dividends which absorbed £5,617,305 (£4,493,844), and a transfer of £3,000,000 (£1,400,000) to general reserve, the balance carried forward declined to £26,542 from £71,608. Meeting, Salisbury, Southern Rhodesia, December 13.

Lower Grade at Mufulira.—Current assets of Mufulira Copper Mines at June 30, 1956, expanded to £27,426,049 from £23,302,576 at the end of the previous year. Owing to a similar increase in liabilities, however, the company's net liquid asset position remained virtually unchanged at about £8,700,000. Total assets rose to £40,509,740 from £34,061,179.

	1955	1956
Mine Output (tons)	3,391,161	4,019,183
Grade (Cu.)	3.38%	3.11%
Cu. Produced (l.tons)	83,193	94,500
Av. Revenue per ton	£274	£341
Av. Cost per ton*	£133	£154
Ore Reserves Tons (000)	135,635	133,102
Grade	3.35%	3.35%

* Delivered buyers.

Mufulira's net profit after tax for the past financial year expanded to £9,289,793 from £6,393,958. After dividends which absorbed £6,886,554 (£5,509,244) and a transfer of £2,500,000 (£1,000,000) to reserve, the balance carried forward improved to £125,516 from £42,861. Rhodesian Selection Trust holds 64 per cent of Mufulira.

Chibuluma's Maiden Output Return.—An expansion of fixed assets to £5,895,134 from £4,344,873 took place at Chibuluma Mines during the year ended June 30, 1956. Current assets also increased to £1,157,782 from £468,793 and exceeded current liabilities by over £100,000. The company's loan from General Services Administration of the U.S.A. was raised to £5,000,000 from £3,514,674.

Having reached the production stage late in 1955, Chibuluma started making profits as from March 1, 1956. During

the four months' period to June 30 profits totalled £287,282 from which loan interest of £284,291 was deducted. The balance carried forward was £1,537. Chibuluma is a subsidiary of Rhodesian Selection Trust which owns 64.29 per cent of its equity.

	1955	1956
Ore Milled (s.tons)	...	125,950
Grade Cu.	...	5.75%
Cobalt	...	0.35%
Cu. Produced (l.tons)*	...	4,340
Av. Revenue per ton	...	£320
Av. Cost per ton†	...	£153
Ore Reserves Tons (000)	...	7,300
Grade Cu.	...	5.23
Grade Cobalt	...	0.25

* Only 2,324 tons sold.

† Not yet representative.

Rhokana's Expansion.—An expansion of total assets to £61,728,616 from £49,173,415 took place at Rhokana Corporation during the year ended June 30, 1956. Fixed assets rose to £31,574,231 from £29,648,269 and current assets to £24,267,361 from £13,973,096. The sharp rise in the latter figure was due to an increase of about £10,000,000 to over £14,000,000 in balances held by the Anglo American Corporation. Net current assets exceeded current liabilities by £4,500,000.

	1955	1956
Tons Milled	3,618,000	4,139,500
Grade (Cu.)	2.55%	2.60%
Cu. Produced (l.tons)	71,288	81,566
Cobalt tons	871	1,271
Ore Reserves Tonnage (000)	100,449	122,853
Grade	3.16%	3.14%

During the past financial year Rhokana made net operating profits after tax of £10,799,000 (£6,190,000). Investment income after tax brought in £5,138,000 against £3,832,000 making a total net revenue of £15,937,000 compared with £10,022,000. After dividends which absorbed £8,777,670 (£6,590,847), unappropriated profits moved up to £548,642 from £427,664. Meeting, Salisbury, Southern Rhodesia, December 13.

Bancroft Ore Reserves Unchanged.—Total assets of Bancroft Mines at June 30, 1956, increased to £12,646,655 from £10,202,852. Fixed assets rose to £10,914,425 from £4,274,944 but current assets declined to £722,682 from £5,235,525. Current liabilities thus exceeded current assets by about £700,000.

A considerable amount of drilling is still in progress at Bancroft and until the results of this activity are available, it will not be possible to adjust the company's ore reserve position. Tonnages available, therefore, remained unchanged at 92,000,000 tons containing 3.67 per cent copper. Meeting, Salisbury, Southern Rhodesia, December 13.

R.C.R. Boosts Throughput.—Interruptions to production through strikes and power shortages were less frequent at Rhodesia Copper Refineries during the year ended June 30, 1956. Accordingly, production from all sections of the plant

increased and output of finished copper rose to 157,294 l.tons from 121,293 l.tons during the previous year. This tonnage was made of 4,708 l.tons of cathodes; 138,527 l.tons of horizontal ingotbars and wirebars, and 14,059 tons of vertically cast wirebars, billets and cakes. The Directors' Report states that the installation of additional furnacing capacity—which will be required to deal with Nchanga's increased leach plant output—is being investigated.

R.C.R.'s balance sheet at the end of the past financial year disclosed a decline in total assets to £3,020,557 from £3,277,201. This was mainly due to the exclusion of any figure under the heading "Stores" against the previous entry of £319,956. Meeting, Salisbury, Southern Rhodesia, December 13.

Rho-Anglo's Investments.—Quoted investments in subsidiary companies held by Rhodesian Anglo American at June 30, 1956, had a market value of £64,383,263 (£71,929,369). This compared with a book entry of £11,160,157 (same). Quoted holdings in other companies shown at a book figure of £2,615,488 had a market worth of £4,637,122. Rho-Anglo's most important investments include a direct holding in Rhokana Corporation of over 52 per cent; a direct and indirect stake in Nchanga Consolidated Copper Mines of virtually 40 per cent, and a 26 per cent direct and indirect holding in Bancroft Mines.

The company's consolidated balance sheet at June 30, 1956, revealed an expansion in total assets to £119,282,336 from £93,765,725. Fixed assets of £55,287,112 compared with the previous figure of £50,388,252 while current assets moved up sharply to £48,781,425 from £29,385,083. Similarly, shareholders' funds increased to £40,511,860 from £32,986,289 and current liabilities rose to £37,886,239 from £27,959,278. Net liquid assets thus totalled some £11,000,000.

During the past financial year group profit attributable to Rho-Anglo after tax rose to £7,373,794 from the previous figure of £5,515,185. A sum of £1,500,000 (£1,064,447) was placed to general reserve, and after dividends which absorbed £5,850,000 (£5,037,500), unappropriated profits rose slightly to £347,650 from £323,856. Meeting, Salisbury, Southern Rhodesia, December 13.

R.S.T. SEPTEMBER QUARTERLIES

	June qtr. 1956	Sept. qtr. 1956
Mufulira		
Sales (tons)	22,837	22,249
	£000's	£000's
Revenue	7,732	6,360
Costs	3,574	3,069
Diff. in value of stocks	*197	£268
Surplus	4,355	3,023
Replacements†	329	184
Profit‡	4,026	2,839
Roan Antelope		
Sales (tons)	21,628	18,807
	£000's	£000's
Revenue	7,209	5,230
Costs	3,549	3,085
Diff. in value of stocks	£12	£58
Surplus	3,648	2,087
Replacements†	184	162
Profit‡	3,464	1,925

* Credit. † Before taxation. ‡ Debit.
† Subject to revision in full year's accounts.

GOLD FIELDS AND WEST WITS

In view of the large number of mines which have recently either paid higher dividends or paid maiden distributions, it is not surprising that the group accounts of New Consolidated Gold Fields—the wholly-owned subsidiary of Consolidated Gold Fields of South Africa—showed the substantial rise of over £400,000 in investment income during the year ended June 30, 1956. This more than offset an equally easy to appreciate drop in profits from share dealing, and overall revenue rose markedly. As previously announced, this resulted in a more liberal distribution to shareholders.

An interesting aspect of the group consolidated balance sheet was the advance in book value of investments to over £13,000,000. Market value of quoted holdings also moved up to over £25,000,000 from the previous figure of about £23,400,000. In spite of a sharp increase in cash holdings, etc., the company's liquid position was slightly reduced—but nevertheless it was still extremely adequate at £3,300,000. Recently the Gold Fields group has shown a marked tendency towards expanding its activities to countries other than South Africa and to minerals other than gold. The yield of about 6½ per cent offered by the £1 ordinary shares at their present price of 60s. is generous.

West Witwatersrand Areas the Gold Fields company which pioneered the famous "West Wits" Mine, also increased its investment income during the financial year ended June 30, 1956, total receipts rising by £100,000 over £860,000. West Wits' main object in life is, of course, to provide an investment spread among the young and expanding gold mines of the West Wits line. At June 30 last, quoted investments shown in the balance sheet at £6,600,000 had a market value of nearly £15,000,000. Of these holdings the company's stake in West Driefontein, whose quoted valuation approached £8,000,000, was by far the largest. This was followed by Blyvooruitzicht at nearly £3,500,000 and Doornfontein at virtually £2,000,000. While some time must necessarily elapse before operations and dividends from these new mines reach their ultimate potentials, progress towards this goal continues at a steady pace unhampered by technical difficulties. At their present price of about 33s. West Wits 2s. 6d. shares as a growth stock offer the very acceptable yield of 7 per cent.

GOLDS REMAIN FIRM IN WEAK MARKETS

During the past week the slide in share values continued on both sides of the Atlantic. The Dow Jones Industrial Index lost as much as 12.29 points to 467.91 and The Financial Times Industrial Ordinary Index 4.4 points to 164.6. The prospect of even dearer money was a depressing influence in the U.S., while production restrictions, resulting from oil shortages, provided a major talking point in London. Despite the recent adverse news golds have been exceptionally firm.

Wall Street's weakness and the statements from the chairmen of Copperbelt companies were responsible for all-round declines in coppers. Diamonds were a poor market; platinum remained largely unchanged and Australian lead-zincs made some gains. Oils again suffered sizeable losses on the week.

FINANCIAL NEWS AND RESULTS IN BRIEF

J.C.I. and Waterpan.—Considerable progress had been made during the year ended June 30, 1956, with prospecting in the vicinity of farms Modderfontein and Waterpan, stated Mr. D. A. B. Watson at the meeting of Johannesburg Consolidated Investment Company. Further drilling he said would, however, still be required to evaluate and define the possible mining area. Although this work would not be completed until early 1957, evidence so far obtained was sufficiently encouraging to warrant preparatory discussions prior to possible flotation.

Mr. Watson was unable to clarify whether the final situation at Freddie's Consolidated would be favourable or unfavourable. But the outlook was more hopeful, although much remained to be done. Any further depreciation of this investment was, however, unlikely to impair J.C.I.'s dividend prospects.

Anaconda's High Earnings.—The Anaconda Company's earnings during nine months ended September 30, 1956, reached \$85,028,092 or \$9.80 per share. During the corresponding period of the previous year net income was only \$49,003,738 or \$5.65 per share.

Winkelhaak Intersection.—The No. 1 shaft at Winkelhaak Mines has intersected Kimberley Reef 1,053 ft. below collar. The area was faulted and an incomplete exposure around the perimeter was therefore obtained. Sections sampled assayed 4.4 dwt. over 19 in.

Higher Values at Harmony.—At the recent meeting of Harmony Gold Mining the chairman stated that during October 550 ft. of reef were sampled of which 455 ft. proved payable averaging 680 in. dwt. This compared with the previous quarter's average of 507 in. dwt.

In his statement to shareholders in respect of year ended 1956 the chairman disclosed plans under which the mine's production would be raised to 135,000 tons per month as from the middle of 1958. Applications have also been made to the A.E.B. for permission to extend the uranium plant.

Offer for Frontino.—Holders of Frontino Gold Mines have received a formal offer from South American Gold and Platinum Company to purchase all the company's 10 per cent £1 cumulative participating preference shares and £1 ordinary units which they do not already hold. The terms of the offer are one \$10.8 year 6 per cent debenture in South American Gold for each £1 ordinary or preference share in Frontino.

Wankie's Capacity Now 5,000,000 Tons P.A.—While a number of capital items still remain to be completed—so far as output capacity is concerned—the Wankie Colliery has achieved its combined target of 5,000,000 tons per annum. But production will continue to be limited by difficulties which still prevent the railways from providing adequate truckage. It is feared that these limitations will continue for some time.

During the year ended August 31, 1956, Wankie's sales output rose to 3,695,356 tons of coal from 3,414,719 tons previously and coke production totalled 242,848 (220,966 tons). The company

made net profits after taxation of £891,647 (£824,012). After dividends which absorbed £441,250 (£386,094) and appropriations to general reserve of £250,000 (same), the balance carried forward rose to £95,397, from £87,918.

As at August 31, 1956, Wankie's assets totalled £11,125,020 compared with the previous year's figure of £10,557,369. Current assets at £3,172,830 exceeded current liabilities by over £2,000,000. Mr. T. Coulter is chairman. Meeting, Bulawayo, December 12.

Inco's Lower Third Quarter's Earnings.

—Owing principally to reductions in the volume of metal deliveries and lower copper prices, net earnings of the International Nickel Company of Canada for the third quarter ended September 30 declined to \$20,822,000 from \$22,322,000 during the corresponding quarter of 1955. During the first nine months of 1956, however, net earnings at \$67,651,000 were \$4,943,000 higher. This represented record earnings of \$4.87 per common share compared with \$4.53.

With the declaration of a 65 c. common dividend and a year-end dividend of \$1.15, Inco's distribution for 1956 has been maintained at the same level as that for 1955. It has been decided that all the company's outstanding 7 per cent preferred stock will be called for redemption for cash on February 1, 1957. This will involve a total cash disbursement of \$34,741,990.

American Metal Pays \$1.75.—With the declaration of a dividend amounting to 90 c. per share—representing a quarterly dividend of 30 c. and a year-end dividend of 60 c., American Metal Company's total cash dividends for the year ended December 31, 1955, have been raised to \$1.75 per share from \$1.50 previously.

Group profits for the quarter ended September 30 at \$2,148,792 compare with \$4,013,060 in the third quarter of 1955. However, with higher other income, including dividends of \$6,858,896 (\$4,784,599), net income of \$9,240,658 compares with the previous corresponding figure of \$9,044,663. The nine months' total in respect of the current year at \$23,287,015 shows a considerable advance on the previous figure of \$19,153,053.

Higher Tax for Kamunting Tin.—In his statement to shareholders of Kamunting Tin Dredging Mr. Jack Addinsell, the chairman, stressed that although profits during the current year ending March 31, 1957, were running at a higher level than those during the past financial period, the company would have to bear a much heavier taxation charge than during the past two years. No more relief would be received in respect of dredge removal expenditure, he said, until further work of this nature was carried out. In addition distributed profits tax had been increased.

Total assets at March 31, 1956, contracted to £1,825,455 from £1,934,511. Current assets at £1,382,103 (£1,288,766) exceeded current liabilities, future taxation and provisions by the large margin of £1,000,000.

(Continued on page 639)

RHODESIAN SELECTION TRUST GROUP OF COMPANIES

Incorporated in Northern Rhodesia

The following are abridgments of the Statements dated October 15th, 1956, by the Chairman, Sir Ronald L. Prain, O.B.E., circulated to the Members.

RHODESIAN SELECTION TRUST

I propose to begin with a brief review of our main interests.

Mufulira

Mufulira is now capable of mining and milling about 400,000 tons of ore per month which would yield about 100,000 tons of copper in a full year.

More recently the discovery of additional ore to the west of the existing mine has led the directors of that company to contemplate the development of "Mufulira West," which might increase the productivity and capacity of the whole enterprise by as much as 50%.

Our holding in that company is now 63.98 per cent.

Chibuluma, Chambishi and Baluba

The bringing of Chibuluma into production has been successfully achieved and the prospects are promising. Our holding in Chibuluma is 64.29 per cent.

The directors of Chambishi have under consideration the opening up of this property on a scale which, initially anyway, would be similar to that of Chibuluma. Our holdings in Chambishi and Baluba remain at 64.29 per cent. Exploration work is continuing at Baluba. Rhodesian Selection Trust Exploration Limited has begun the investigation of several prospects in Southern Rhodesia and Nyasaland.

Financial

Our income came predominantly from dividends of the Mufulira Company and amounted to £4.4m. This enabled us to pay an interim dividend of 2s. per share, less taxes, and a final dividend of 4s. per share, less taxes, is now recommended. This distribution will cost £4.2m. and will allow the cash position to be further built up after making provision for all commitments, and transferring £75,000 to General Reserve.

Miscellaneous

The Mufulira Chairman's Statement sounds a note of warning as to the possibility of lower profits this year, due to the present price of copper being at a substantially lower level, and to costs not being appreciably reduced.

Your Company announced during the past year that it had joined with several other sponsors in creating the Merchant Bank of Central Africa. In this way the Company hopes to be in a position to play a part in the development of the Federation in spheres not necessarily connected with mining.

Conclusion

Your Companies, since they emigrated from the United Kingdom and more particularly since they moved to the capital of the Federation, have tried to associate themselves more and more with the general development of this young and virile country. It is my conviction that the prosperity of the country and the prosperity of the copper mining industry are indivisible and that your Companies

must inevitably face duties and responsibilities which go far beyond those which normally concern the management of a mining enterprise.

MUFULIRA COPPER MINES

The production of ore for the first time exceeded 4m. tons, and the output of molten blister copper was 97,098 tons, which is easily a record. Saleable production totalled 94,500 long tons, made up as to 27,623 tons blister, 57,335 tons cathodes and 9,542 tons wirebars.

The average cost per long ton of copper increased from £133 to £153.

Financial Results

The average price at which our copper was sold was £340 per ton, an increase of £66 over the previous year. To the profit of £16.8m. has to be added the increase in the value of copper stocks and interest earned. Tax amounts to £6.6m.; £2.3m. has been appropriated to Replacements and £2.5m. to General Reserve.

The interim dividend was 8s. per share, less taxes, and the final dividend now recommended is 17s. per share, less taxes.

The price of copper since July 1 has been much lower than the average realization for last year. On the cost side we know of forthcoming increases under various headings which, in spite of the effect of a lower price on the reduction of mineral royalties, may mean that our overall cost is not appreciably lower.

We expect that our production will reach the 100,000 ton mark, but even this factor will not compensate for the reduction in profit margin based on the present price of copper. Our commitments under the heading of Replacements Reserve and General Reserve will continue heavy. Therefore, unless the price of copper should undergo some very appreciable, and unexpected, upswing, our dividend for the current year will be lower.

Mine Expansion

Exploration to the west of the mine has disclosed the continuation of the "C" orebody to an extent not yet defined, but well beyond the previously anticipated limits. The extent of this additional ore is known to be of sufficient magnitude to warrant an expansion of the Mufulira operation, which we hope will be of the order of 50%.

Labour Position

Constructive progress was made in implementing the practical aspects of the African advancement agreement signed between the Copper Mining Companies and the European Mine Workers' Union.

Unfortunately, towards the end of the financial year, the African Mineworkers' Trade Union began a series of strikes which continued into the months of July, August and September. The direct cause of these strikes was the wish of the African Union to eliminate the Mines' African Staff Association. This association, which came into being in 1953, was recognized by the companies and the African Union in 1955 as representing certain senior categories of African jobs.

The strikes which the African Union called, while not being illegal, were un-

constitutional in that the Union had not gone through the procedure laid down by its agreement with the companies. For this reason the companies on August 1st, 1956, declared a dispute with the African Union and asked Government to set up a Board of Inquiry to investigate the whole position. Later in August the Government appointed a Commission of Inquiry, which is still sitting.

African strikes continued throughout August. Early in September circumstances became such as to bring about on September 11 a Government declaration of a State of Emergency, followed by prompt Government detention of some of the officers of the African Union. Since then work has been resumed at all mines, and operations have reverted to normal.

Power

The Federal Government completed arrangements for financing the Kariba hydro-electric scheme. The four major copper producing companies agreed to lend the Government £20m. by subscriptions to Federal Development Bonds carrying maturities varying from one to 28 years, with interest of 4½ per cent. per annum. The share of each company in this total loan, part of which is earmarked for railway development, is a subject for discussion, and that of your Company is tentatively put at £5m. The companies entered into this arrangement with Government willingly, realizing that without the Kariba scheme the Copperbelt would be faced with having to provide alternative and costly methods of producing more power than the present installations can deliver.

During the last few weeks the Copperbelt electric power system has been interconnected with the Belgian Congo system.

Miscellaneous

Prospecting and exploration under the aegis of the companies formed for this purpose, and in which your Company has an interest, continued on an increasing scale during the year.

During the year Vainona Estates Limited, in which your Company has a financial interest, decided to proceed with an experimental agricultural scheme on the Kafue Flats. This takes the form of a pilot polder which will, during the next five or six years, seek to prove whether or not some of the engineering problems of a greatly extended scheme on the Flats can be solved, and whether the soils can produce a rotation of wheat, rice and barley which would make a major contribution to the Territory's food supplies.

(The Chairman's remarks under the headings Northern Territories and Copper Price are similar to those contained in his Roan Antelope Statement.)

ROAN ANTELOPE COPPER MINES LIMITED

The production of ore for the first time exceeded 5½m. tons, and the output of blister was 88,714 long tons, a record.

The average cost per long ton of copper increased from £142 to £167 per ton.

Financial Results

The average price at which our copper was sold was £336 per ton, an increase of £66 over the previous year. The profit was £14.1m. to which has to be added the increase in the value of copper stocks and interest earned. Tax amounts to £5.7m. and from the resulting net profit £1.5m. has been appropriated to Replacements and £3m. to General Reserve.

The interim dividend was 1s. 9d. per share, less taxes, and the final dividend now recommended is 3s. 3d., less taxes.

The price of copper since July 1st has been much lower than the average realization for the year under review. On the cost side, we know of increases which may mean that our overall cost is not appreciably lower. Moreover, our production is unlikely to be as high as last year. This year our operations have already been affected by strikes. Our commitments under the heading of Replacements Reserve and General Reserve will continue heavy. Therefore, unless the price of copper should undergo some very appreciable, and unexpected, upswing, our dividend for the current year will be lower.

Mine and Refinery

The long-term outlook for Roan will continue to depend on the exploration results on the Muliashi Special Grant. Roan continues to be one of the largest operations in the mining world, and it is not impossible that the mining and milling rate during the next twelve months might reach 6m. tons per annum.

This month sees the completion of 25 years of blister production at Roan, during which time it has produced more than 1.6m. tons of copper to a total value, in historical pounds, of about £186m.

The construction of the electrolytic refinery at Ndola continued satisfactorily. The capacity will be increased to 110,000 tons of copper, and the cost will correspondingly increase from the original figure of £3m. to £4½m.

Northern Territories

During the year your Company offered a loan of £1m. to the Government of Northern Rhodesia and £500,000 to the Government of Nyasaland, to be used exclusively for African development. These loans, which were gratefully accepted by these Governments, are interest-free until 1960, when the Governments have the option to convert all or any part of them into loans for up to 20 years at an interest rate of 4½ per cent. per annum.

Copper Price

The price of copper continued to rise on the world markets and reached a high point in March of this year. Then, the inevitable reaction took place. It was marked in its severest form in the quotations of the London Metal Exchange which, from a high point of £437 on March 19th declined to a figure of £264 on July 3rd. This fall in price, both for magnitude and speed, is unprecedented in the history of the copper business. Most of the other major quotations in the copper market also registered severe falls, though none to the extent registered by the London Metal Exchange. Since June the market has steadied and at the time of writing the world prices range from £280 to £320.

As far as the copper produced by your Company is concerned, we have continued to sell at fixed prices, which policy we introduced in May, 1955, in response to a request made to us by the copper fabricating industry of Great Britain. During the year under review our price changed six times compared with 242 moves in the London Metal Exchange price, or, if we eliminate price changes of less than £2 in the latter, the comparison would be with 170 changes in Metal Exchange quotations. During the period between May, 1955, and the present time the price of our copper has changed nine times

compared with 237 movements on the Metal Exchange, eliminating price movements of less than £2 on the latter.

We realize that there exists in the United Kingdom a two-price system, and that this can cause certain inconveniences to the trade. In our opinion, such inconveniences are not such as to warrant our returning to a system of daily price changes, though we are at all times prepared to consider any constructive proposals designed with a view to introducing greater stability into the price of not only our product, but the copper price generally.

Conclusion

To sum up, it is our hope that after the unsettled labour position of the last three months conditions may now settle down to enable us to get on with our job of producing copper, and of continuing thereby to provide some of the sinews for the development of the Federation.

So far the copper price for the current year is much below last year's average. This situation, if it continues, coupled with no expectation of any appreciable reduction in our costs, indicates a lower profit margin per ton, hence lower profits, and therefore a lower dividend.

The profits for the past year must be considered exceptional however: a return to lower profits can only be regarded as a return to more normal conditions.

(The Chairman's remarks under the headings Labour Position and Power are similar to those contained in his Mufulira Statement.)

CHIBULUMA MINES LIMITED

The mine started hoisting ore in October, 1955, and the concentrator came into full operation in April, 1956.

The plan for Chibuluma is to mine about 40,000 tons of ore per month and to produce at the mill a copper concentrate and a cobalt concentrate.

The year was not only a broken period, but being the early stages was not representative of Chibuluma's capabilities, either as to production rates or costs. It mined about 81,000 tons and milled about 126,000 tons of ore, representing all the ore from mining and the rest from previous development work.

The costs were about £153 per long ton of blister. For the first two months of this year costs have been £116 per ton, reflecting a rate of mining and milling under more normal conditions. Of the 4,340 long tons of blister produced, 2,324 were sold at an average price of £319 per ton, giving Chibuluma an apparent profit margin of £166 per ton. The profit for the period, after providing £20,000 for Replacements Reserve, was £287,282.

Agreement With U.S. Government

Under this agreement we are to start repayments on our loan, in the form of metal, in the year after the first year in which profits exceed £150,000. As a result we shall this year be making deliveries to the U.S. Government of copper to the value of about £285,000.

Cobalt Plant

This plant is now expected to begin operations in the middle of 1957. The overall recovery of cobalt is expected to be unusually high. If these expectations are fulfilled in the full scale plant, our eventual cobalt production should be in excess of 1m. lbs. per annum, compared with the original estimates of 500,000 lbs. per annum.

Financial News and Results

(Continued from page 637)

Tekka Treats Less Ground.—Tekka's total assets at March 31, 1956, at £433,633 compared with the previous year's figure of £435,347. Current assets of £173,632 exceeded current liabilities and future taxation by £23,832. During the past financial year Tekka recovered 138.23 tons of tin ore compared with 149.15 tons during the preceding year. Although the grade obtained per cu. yd. rose to 0.92 lb. from 0.89 lb., the total volume of ground treated fell away to 335,100 cu. yds. from 376,000 cu. yds. The company made net profits after tax of £13,202 compared with £10,510 and the carry forward rose to £30,224 from £28,619. Mr. D. W. Thomas is chairman.

Expansion of Tronoh's Investments.—A rise in the book value of Tronoh Mines' quoted and unquoted investments during the year ended December 31, 1955, to £1,209,455 from £951,420 previously, together with a purchase of tax reserve certificates amounting to £50,000, was mainly responsible for raising the company's current asset figure to £1,858,109 from £1,548,303. Current liabilities and provision for income tax were thus exceeded by £1,169,590. Total assets expanded to £2,310,250 from £2,036,279. During the past financial year Tronoh made net profits after taxation and expenses of £430,432 against £329,393. After dividends which absorbed £271,875 (216.375), the balance unappropriated declined to £311,977 from £348,482. Mr. J. H. Rich is chairman. Meeting, London, November 16.

Southern Tronoh's Fixed Asset Position.—Total assets of Southern Tronoh Tin Dredging at December 31, 1955, remained virtually unchanged at £654,117 compared with £643,567 at the end of the preceding year. But owing to a drop to £34,951 from £84,318 under the heading Plant and Machinery, the company's fixed assets were almost halved at £52,201 from £104,318. This change was due to the major part of conversion and electrification plant purchased in prior years for £73,548 and not installed, being sold to associated companies. Reflecting this, current assets expanded to £591,999 from £530,020, and exceeded current liabilities and provision for taxation by £441,751.

During its past financial year the company made net profits after taxation and expenses of £94,222 compared with £166,174. After dividends, which absorbed £31,625 (£33,000), the balance unappropriated declined to £50,969 from £53,418. Mr. J. H. Rich is chairman. Meeting, London, November 16.

Southern Malayan and Malayan Tin Pay More.—With a final dividend of 10 per cent on its capital of £900,000, Malayan Tin Dredging's total distribution for the year ended June 30, 1956, had been raised to 40 per cent. Dividends during the previous twelve months—paid partly before the 200 per cent scrip issue—represented 26½ per cent on the present capital. Net profit after tax has risen to £580,146 from £472,647.

Southern Malayan Tin Dredging is paying a final of 6½ per cent to make 33½ per cent for the year ended June 30, 1956. Previously, equivalent dividends—allowing for the company's 7 for 3 scrip issue—totalled 32½ per cent. Net profit after tax rose slightly to £321,462 from £317,340. Both companies will hold their meetings on December 14.

RHODESIAN ANGLO AMERICAN LIMITED

(Incorporated in Northern Rhodesia)

MARKET VALUE OF INVESTMENTS TOTALS £83 MILLION

SIR ERNEST OPPENHEIMER'S REVIEW

The following are extracts from the Statement by the Chairman, **Sir Ernest Oppenheimer**, which has been circulated with the annual report and accounts for the year ended June 30, 1956.

Our company is one of the premier investment companies in the Federation. At September 30, 1956, our investments, based on market price, were valued at £83,000,000. We are, therefore, not only concerned with the well-being of the companies in which we have investments, but are interested in the affairs and the development of the Federation as a whole.

Mining Developments

In the field of mining, the expense of proving and equipping new mines is very great indeed. At this time, some three months before Bancroft Mines—in which we have a very large stake through Rhokana Corporation—is expected to come into production, I am very conscious of the money and human effort that have been called for. About £18,000,000 will have been spent on the first and second stages by the time the proceeds of the first ton of copper are received. It has taken five years to open this mine and it will have to operate for some time before the original investors receive any reward. All investment in developing mines carries the normal risks associated with mining ventures, and those who provide this "risk money" may justifiably expect a good reward. Bancroft is proceeding with the second stage of its development, which will increase its copper production to some 85,000 tons by 1960.

Mining developments already planned in Northern Rhodesia will require the Companies to find some £50,000,000 by the end of 1960. Some of this money will probably come from profits, and I am confident that, provided the mining industry in Northern Rhodesia is not asked to carry too much of the burden of development outside its own sphere the capital will be obtained.

The Federal and Territorial Governments are devoting much energy to the provision of services to keep pace with the rapid growth of the Country. The copper-mining companies have been prepared to make notable contributions to the funds required. They have jointly agreed to provide a loan of £20,000,000 over five years for the Kariba project and other essential development, and to accept power from Kariba for some years at a price which should enable that undertaking to operate profitably from the start. Furthermore, our group of companies has, through Anglo American Rhodesian Development Corporation, Limited, assisted the railways with the loan of £1,000,000 and has provided £5,000,000 for the purchase of trucks, which will hire to the railways. 1,599 trucks are already in service.

The decision of the Southern Rhodesian Government to hand over the Rhodesian Iron and Steel Commission to private enterprise is a welcome one, and a great expansion of the steel industry in the Federation can be expected. Lancashire Steel and Stewarts and Lloyds and other financial institutions of high standing,

including the Anglo American Corporation, have indicated that they are prepared to make a substantial investment in this essential industry, and we have expressed our willingness to participate.

Investments

We have made an important investment in Rhodesian Acceptances, Limited, which started business on October 1. This company, which has the support of one of the most important merchant banking institutions in Britain, has as its main function the financing of transactions of approved industrial and commercial establishments by granting credits and by accepting and discounting first-class bills of exchange, including acceptances by commercial banks and other recognised financial institutions. It will finance the export of Rhodesian-manufactured goods, the import of goods to the Federation, and the purchase of raw materials for local manufacturers.

We increased our investment in Wankie Colliery during the year by the purchase of 718,732 shares. This company is now equipped to produce over 5,000,000 tons of coal a year and could export over 1,000,000 tons a year, if railway transport was available.

We have increased our investments by £1,063,290 during the year and, to pro-

vide for this, and to strengthen our cash position, we have placed £1,500,000 of the net profit of £7,373,794 to General Reserve, which now stands at £3,100,000.

We have recommended a final dividend of 7s. net, which, together with the interim dividend of 2s., makes 9s. net for the year.

Increase of Capital

Earlier in this statement I drew attention to the large mining developments that are either in progress or which have been foreshadowed. For these and other enterprises in which we may well wish to participate, substantial funds may at some time be required and we feel that we should be in a position at relatively short notice to take advantage of new business which we may seek or be offered. To allow for some elasticity in this matter and to provide scope for wider investment, we propose that the authorised capital of the company be increased from £6,500,000 to £7,000,000 by the creation of 1,000,000 shares of 10s. each, and you will be asked to approve of this recommendation at the forthcoming Annual General Meeting.

I am confident that Rhodesia remains a field for profitable investment and that, although the country will have to tackle the normal problems which rapid expansion creates, the developments that are taking place and those which are planned will increase the capacity of the country to produce, export and earn, and that they will result in a more diversified economy which will secure a high standard of living for all its citizens.

RHOKANA CORPORATION LIMITED

(Incorporated in Northern Rhodesia)

RECORD PRODUCTION AND PROFITS

SIR ERNEST OPPENHEIMER'S REVIEW

The following are extracts from the Statement by the Chairman, **Sir Ernest Oppenheimer**, which has been circulated with the annual report and accounts for the year ended June 30, 1956.

Your company has never had a more profitable year. Record production, record prices for copper and an operating year during which Rhokana was, until the last month of the year, free of industrial troubles, have resulted in record profits and permitted the payment of a record dividend.

Since the end of the year, however, certain conditions have arisen to emphasise the desirability of maintaining a realistic and prudent policy in regard to reserves and dividends.

The net profit for the year of £15,937,000 included the income from dividends on our investments; and, after providing £3,000,000 for capital expenditure, £12,937,000 was available for appropriation. We decided to create a general reserve to ease the burden of our commitments, especially our obligation to subscribe for Federal Government Development Bonds, and an amount of £4,200,000 was, therefore, transferred to general reserve. This amount included £1,200,000 for the Development Bonds which we subscribed in July.

We have recommended a final dividend of 55/- net, which with the 15/- net interim dividend, makes a record total of 70/- net for the year.

It is gratifying to report an increase in the ore reserves at Nkana and Mindola from 100,449,300 s.tons to 122,853,200 s.tons, which represents a considerable extension to the life of the mine.

African Advancement

One of the most important factors in the future of the copper mining industry is the agreement reached with our European employees last year, in regard to African advancement. Good progress in implementing the agreement has been achieved and our African employees are beginning to see the practical benefits.

At Nkana 95 Africans had, at the beginning of October, already been advanced into categories of work previously carried out by Europeans, and 20 into newly-created senior African posts outside the European field. A further 71 Africans are at present undergoing training for various advanced jobs.

Our relations with our European employees have remained excellent throughout the year and I should like to pay tribute to the patience and self-control which they maintained during the recent series of strikes called by the African Mineworkers' Union.

The Government appointed a commission to enquire fully into the reasons underlying the unrest and we have, submitted evidence to the Commission.

You will have read in the press of the Federal Government's decision to proceed with the hydro-electric project in the Kariba Gorge at a total eventual estimated cost of £113,000,000. The four Northern Rhodesian copper-producing companies offered to make £20,000,000 of this total available to the Federal Government at a rate of 4½ per cent interest, and, in addition, agreed to accept power from Kariba, when available, at a price which will provide another £10,000,000. The proportion of the £20,000,000 for which your company will be responsible over a period of 5 years, will be in the neighbourhood of £4,250,000.

Included in the total profit is an amount of £5,138,000 derived from your Company's considerable shareholdings in Nchanga and Mufulira, both of which have had very successful years. Nchanga paid a dividend of 30/- in respect of the year's production, but the benefit of the increased final dividend of 10/7½d, paid by Mufulira will not be brought into account until next year.

In addition, your company has a considerable capital investment in Bancroft Mines, where it is confidently expected that production will start at the beginning of next year. Work on increasing the capacity of the plant to produce 85,600 long tons of copper by 1960 has already started and before very long we can expect an important contribution to our dividend income from this source.

Chibuluma Mines, Limited, in which we also have a large interest, is already in production.

Improved Power Position

The link with the Congo was opened in September and an improvement in the power position was immediately noticeable. The expensive expedients of wood-burning and the import of coal through Lobito can now be dispensed with. It is much to the credit of our friends in the Belgian Congo and the Rhodesia Congo Border Power Corporation, that they completed this work several months ahead of the anticipated date. It still remains imperative that power from the Kariba project should be available to the Copper companies by the middle of 1960, as not only will the increasing requirements of the existing producing companies have to be supplied but the new projects and expansion programmes depend on this power being available.

The companies were recently faced with a steep increase in railage rates, which have been doubled. Although we have had discussions with the railways and have made the strongest possible representations, we have been unable to obtain any important concessions. The new rates will have a significant effect upon the overall cost of marketing Rhodesian copper.

During the year under review the price of copper rose on the London Metal Exchange to a figure well over £400 per ton, but it reacted sharply during the last few months and at the end of June stood at £275. World production of copper is increasing and there are signs that the unbalanced position in recent years between supply and demand is being adjusted. Within the next few years, however, expansion in the copper-consuming industries, and expected growth of copper consumption in the under-developed areas of the world, should stimulate further increases in demand, and I am confident that there will be a ready market for the full output from your mine.

WANKIE COLLIERY COMPANY LIMITED

(Incorporated in Southern Rhodesia)

OUTPUT CAPACITY RAISED TO 5,000,000 TONS

The following extracts are from the statement by the Chairman, **Mr. T. Coulter**, which has been circulated with the annual report and accounts for the year ended August 31, 1956:

Accounts

The profit for the year before taxation, amounted to £1,141,647 as compared with £1,084,012 for 1955, being an improvement of £57,635.

Taxation absorbed £250,000 and a sum of £105,000 was transferred to taxation equalisation reserve. An amount of £250,000 was transferred to general reserve, which now stands at £985,000.

The total distribution to shareholders for the year was 1s. 0d. per share and compares with 10½d. per share paid last year.

Capital expenditure on fixed assets during the year, less sales, amounted to £1,004,017.

Current assets (excluding stocks and stores), at £2,510,050, as against current liabilities of £1,068,093, indicate a surplus of £1,441,957 represented by Federal Government stocks and short-term loans and deposits.

The following tabulation gives a comparison of the sales of coal and coke for the past three years ended August 31:

	1954	1955	1956
	Tons	Tons	Tons
Coal ...	2,732,957	3,414,719	3,695,356
Coke ...	154,617	220,966	242,848

It will be noted that sales of coal increased by only 280,637 tons as compared with the previous year, and this may well be regarded as the big disappointing feature of operations for the past year.

Despatches of coal are limited by the difficulties which still confront the railways in providing adequate truckage. Advance estimates of railway coal-carrying capacity for the current financial year do not encourage the hope of any appreciable improvement.

Coal Price Agreement

In my review for the previous year it was stated that, in expectation of a further increase in despatches, coupled with improved production efficiency, the average selling price of coal was being reduced by 5d. per ton to 18s. 10d. per ton at the pit-mouth, with effect from November 1, 1955. Our hopes of a further substantial increase in despatches were not realised, and it therefore became necessary about the middle of the past year to apply, in terms of the Price Agreement, for a small upward adjustment in the average selling price. This was agreed by the Government and from March 1, 1956, the average price was increased by 8d. per ton to 19s. 6d. per ton at pit-mouth.

The price to be charged during the current year, with effect from November 1, 1956, has been provisionally agreed at 19s. 6d. per ton at the pit-mouth.

We can, I feel, take pride in the fact that the great task undertaken by the Company in 1953 to increase its colliery capacity to 5,000,000 tons by the end of 1956 has now been completed.

The total proved reserves of extractable coal lying within the limits of the reduced concession and option areas is of the order of magnitude that will allow the Company to produce coal for about 95 years from present date, at the rate of

5,000,000 tons per annum. Boring has proved the existence of over 100 million tons of high grade coal, lying at varying depths up to 150 feet of surface cover, which can be extracted economically by opencast working.

There is, however, no question of embarking on opencast work at the present time, for Wankie is already equipped to produce much more coal than the railways can handle.

Community Development

Our responsibilities to the African section of our employees have been and still remain, particularly heavy. Three years ago accommodation for Africans, both single and married, was largely obsolete and inadequate. The conditions were such as seriously to jeopardise Wankie's ability to obtain an adequate labour force.

We have worked towards setting these things right on the basis that 25 per cent to 30 per cent, of the Company's African employees would be provided with married accommodation. To date we have built some 1,420 houses, and approximately 235,000 square feet of other building work has been, or will shortly be completed in the African areas.

The new hospital has ensured that the whole community will have the most up-to-date medical facilities at its disposal. We have also placed great emphasis on the development of welfare and recreational activities.

These endeavours have undoubtedly resulted in a healthier, happier and more efficient labour force.

SENIOR QUARRY ENGINEER

required for tour of 12-18 months with United Nations Korean Reconstruction Agency to open up LIMESTONE QUARRY to supply new cement works. Please apply (with full personal particulars) for terms to Secretary, Powell Duffryn Technical Services Ltd., 19 Berkeley Street, London, W.1.

GEOLOGISTS required by KUWAIT OIL COMPANY for service in KUWAIT.

Candidates must possess a degree in Geology and should have not less than two years' experience in sub-surface petroleum geology, including well-sitting, sample handling, well logging and report writing. Age 25-35. Salary will be in accordance with experience but not less than £1,100 basic or £1,845 gross, including allowance in local currency. Pension Scheme; kit allowance. Write for application form, quoting K.2137/8, to Box M/86, c/o 191 Gresham House, E.C.2.

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JOHANNESBURG CONSOLIDATED INVESTMENT COMPANY LIMITED

(Incorporated in the Union of South Africa)

EXTRACT FROM MR. D. A. B. WATSON'S SPEECH

The annual general meeting of the Johannesburg Consolidated Investment Company, Limited, was held on November 20 in Johannesburg.

Mr. D. A. B. Watson presided in the unavoidable absence of Mr. H. J. Joel, the chairman, and in the course of his speech said:—

You will see from the Balance Sheet that the increase in the book value of investments is £1,879,000, but after allowing for the net amount of some £975,000 applied out of Reserve in reduction of the book value of certain holdings, the amount invested during the year, i.e. purchases less sales, was £2,854,000. The net depreciation of £975,000 is more than accounted for by the further depreciation of some £1M on the Company's holding in Freddie's Consolidated Mines Limited, which holding did not alter materially during the year. There was a net re-appreciation of £43,000 in the book value of other investments.

The additional amount invested during the year is reflected in a reduction in the net current assets from £3,062,000 to £1,723,000, a reduction of £1,339,000. The balance of the amount invested arises from profits earned during the year and retained in the business.

Under the heading "Investment Reserve" a sum of £1,475,000 was transferred from Profit and Loss Account, and, after providing the amount of £975,000 for the net reduction in book value of investments, there is now an amount of £500,000 at the credit of this Reserve.

Profit and Loss Account

The net profit for the year before providing for taxation shows an increase of £364,000, which is more than accounted for by an increase in income from investments of £401,000. This latter increase is satisfactory and is spread over the greater part of our investment portfolio.

Although the necessity to provide for this further investment depreciation has absorbed a substantial part of the year's profits, your Directors are very pleased at being able so soon to restore the rate of dividend to its former level, so mitigating the disappointment which they, and no doubt you, felt at the circumstances which last year led to their decision to reduce the rate of dividend, even though by a small amount. My colleagues and I naturally hope that the necessity for such a decision will not arise again, notwithstanding the fact that the circumstances to which I have referred, namely the position with regard to our investment in Freddie's Consolidated Mines Limited, cannot be said to have been finally clarified in either a favourable or unfavourable sense. The outlook is indeed more hopeful than was the case a year ago, but there is still much to be done and it will be some time before the future of the mine can be clearly determined. I am, however, of the opinion that any further depreciation of this investment which might have to be dealt with in the Accounts is unlikely of itself to be such as to impair the prospect of maintaining the present rate of dividend.

After providing for the increased dividend, and transferring the sum of

£1,475,000 to Investment Reserve, as already mentioned, the amount carried forward on Profit and Loss has been increased by £183,000.

During the year we increased our holdings in certain concerns, mainly colliery undertakings in the Union, and have now become the majority shareholder therein. Consequently, our total investment in Subsidiary Companies increased substantially.

I have already mentioned the increase of some £400,000 in the income arising from investments. These investments are spread over a reasonably wide field and, as might be expected of a South African Mining Finance House, are largely in mining enterprises conducted in Southern Africa. It is therefore appropriate to review generally the present state of mineral production in Southern Africa in so far as this may effect your Company's interests.

The overall picture is one of expansion. The value of sales of minerals produced in the Union during the year 1955 increased by £41M to a total of £289M, an increment of 17% as compared with the previous year. By far the greatest proportion of the increase of £41M was an additional £33M received from the production of gold and uranium. Expansion in this field has continued into the current year when for the first nine months the value of the gold output and the declared profits from uranium were £17.3M greater than that for the similar period last year.

Vulnerable Mines

I would like to refer to the question of the so-called vulnerable mines; that is, mines whose margins of profitability are so slender that small variations in costs

or revenue may reduce these profits to vanishing point and bring about their closure.

First of all, I would like to state that in my opinion the question of assistance is one for decision by the Government and not one which can be dealt with by the gold mining industry.

Secondly, I would like to express the opinion that the only effective form of assistance which can be given to vulnerable mines is some form of subsidy. If it is decided in the national interest to provide some direct assistance, this should be financed from General Revenue and not by added burdens placed on other producers.

Whatever action if any may finally be taken to prevent the closure of vulnerable mines, it is important that our attention should not be diverted from the long recognized task of protecting vulnerable ore from the effects of rising working costs. Apart from the present world-wide inflationary trends, there are several factors which tend to raise South African mining costs. These include the wide seasonal variation in the supply of Native labour, discriminatory railway tariffs, protective customs policies, ratings by local authorities and the general trend of rising wages.

The present situation of vulnerable mines and vulnerable ore is one which is not peculiar to the present, and, if South African production of gold is to be maintained, the replacement of dying mines remains a continuing necessity.

Present circumstances are such that not only is vulnerable or marginal ore in existing mines under threat, but also the gold deposits which may await discovery and future exploitation. Present circumstances may change, but until they do only the discovery of relatively high-grade ore can, under current conditions, lead to the flotation of new mining companies.

Mr. Watson concluded by reviewing the other widespread interests of the group.

THE CEMENTATION COMPANY

INCREASED PROFITS

The thirty-sixth Annual General Meeting of The Cementation Company Limited, will be held on December 13 in London.

The following is an extract from the Statement by the Chairman, Mr. A. R. Neelands, circulated with the report and accounts for the year to March 31, 1956:—

Trading Profits of the Group for the year ended March 31, 1956, are £680,665, £48,525 more than published last year. The consolidated accounts this year incorporate those of a foreign subsidiary not previously consolidated. After making the necessary adjustments to last year's figure the increase in Trading Profit is £10,464.

There is a slight reduction in the overall charge for Taxation but because of the increased amount required for dividends on the new Capital and the Distribution Tax thereon at an increased rate, the charge for Profits Tax is increased by nearly £35,000. The net profit figure after taxation is £15,000 more than last year.

In spite of rigid control of Capital Expenditure the amount spent on Fixed Assets for the Group this year is of the order of £1,400,000 or £600,000 more than

last year which with the financing of contracts fully occupied our available liquid resources. Towards the end of the year under review we raised further finance by an Ordinary Rights Issue and a further Issue of Unsecured Loan Stock.

Important Contracts

Interesting and helpful though our work abroad may be, as also attractive in future prospects, the great bulk of our work continues to be centred in the British Isles. Here we have carried out an increasing amount of Public Works Construction but the bulk of this has been on contracts smaller than the Lawers Hydro-Electric Project, which continues to make satisfactory progress and is now nearing completion, and the Loch Erne Drainage Contract, work connected with the Erne-Hydro Electric Scheme, is still nearer completion.

In Cementation itself our largest single Contract is abroad in Iraq at the Dukan Dam. In this work we are associated with the French Company—Enterprise P. Bachy. The work has now properly started and is well organized and by agreement with Bachy we have taken over the supervision and direction of the work on the site.

Specialist Cementation work in England continues to play a most important and valuable part in our constructional work. To-day we have by no means a monopoly of this class of work and have to fight against severe competition from numerous sources and it is with reasonable satisfaction that I can tell you that our turnover is increasing. Needless to say the endeavour to get better and better results never ceases.

Mining Work

Our Mining work in shaft sinking and underground development continues to expand in accordance with the National Coal Board shaft sinking development programme. It is our duty and also our wish to work in close conjunction with their representatives in the different areas, an association which is to our mutual advantage and economy. We appreciate their help and advice which is not only valuable to us but to the whole country as well. We have pressed forward with our method of mechanical loading and shaft sinking and have now made and installed mechanical excavators at six contracts. Our Mining Department is still working in Turkey but our present contracts are drawing to a close. Our Company in Eire is engaged in a certain amount of shaft sinking and in South Africa underground drilling and grouting are one of our principal activities. In Canada we have under negotiation shaft sinking contracts in the Saskatchewan Potassium Fields.

Our association with the Ministry of Fuel and Power for the research in underground gasification of coal continued throughout the year and still continues, but at the end of the year the development reached a stage where it was possible for the Ministry of Fuel and Power to publish a Blue Book reporting generally that the work had been satisfactory and recommending that the production of power from gas should now be tried out in a practical way on a small scale with pilot plants. This phase of investigation was taken over by the National Coal Board who have appointed an Underground Gasification Executive. We have been asked with others to submit proposals to this Committee for the further development of this research.

Our principal Subsidiary Company at home, Messrs. John Thom Limited, who are engaged in well drilling, mineral drilling and prospect drilling, had a good year. Of late years the deep drilling for the National Coal Board has been their principal activity. The National Coal Board, however, have largely completed their drilling programme and this will lead to a reduction in work available in this country. The Company hope and expect to replace this work with extra work abroad; their experience, the excellency of their performance and their almost 100% recovery of cores, when these are required, should enable them to get sufficient work overseas to maintain at least their present turnover.

With your consent we propose to pay a dividend of 12½% on the ordinary shares—the same as last year—but on an increased capital.

AN EXPLORATION COMPANY is considering undertaking prospecting operations in Eire. Any companies interested in base metal or non-metallic minerals in this area, are invited to contact Box No. 589, The Mining Journal Ltd., 15 Wilson Street, Moorgate, London, E.C.2.

TRONOH MINES

MR. J. H. RICH'S STATEMENT

The fifty-fourth annual general meeting of Tronoh Mines, Ltd., was held on November 16 at 73 Cheapside, London, E.C.

Mr. J. H. Rich, Chairman, presided.

The following is an extract from his Statement circulated to Shareholders:—

The working profit for the year ended December 31, 1955, is £920,046. Dividends totalling 2s. per share, less Tax, have been paid and the Directors recommend a Final Dividend of 4½d. per share, less Tax.

Labour Unrest

In my statement last year reference was made to a strike that had taken place at the Kampar Section in March of the year now under review, which was quickly settled. During the course of the strike there were clashes between the strikers and the newly recruited labour, which called for the intervention of Police. The Government appointed a Commission to enquire into the circumstances leading up to and surrounding the incidents, and to ascertain whether there was any unjustified intervention by Government forces. It is gratifying to know that the management were absolved from all blame for the strike and the subsequent incidents, and the steps they took to deal with the situation were thoroughly vindicated. It was also found that there was no unjustified intervention by the Government authorities.

There has been considerable labour unrest in the mining industry during the current year. One form in which it showed itself was by Sunday strikes. I am glad to say that it received very little support from this Company's labour force, but the same cannot be said of most of the mines. The main cause of the unrest, which is fairly general throughout the country, are the inexperience and irresponsibility of the so-called leaders of the trade unions, who appear to use their powers either for their own ends or for political purposes.

Although no incidents due to terrorist activities occurred on the Company's properties during the year, the position is not free from danger. This is particularly the case at Tronoh where a party of terrorists appears to be located in the Forest Reserve adjoining the southern boundary.

Outlook for Tin

The requisite number of countries comprising the parties to the International Tin Agreement have now ratified that agreement and it has become operative, but in view of the latest figures of supply and demand any question of immediate compulsory restriction of output is extremely remote. The first step to be taken is the establishment of the Buffer Stock by means of contributions by producer members either in tin metal or its cash equivalent. The initial contributions amount to the equivalent of 15,000 tons of tin metal and under the Agreement these have to be received by the middle of December. Malaya's share of the Buffer Stock is 5,491 tons or its equivalent in cash. It is unlikely that producers will be willing to make their contributions in the form of metal with the price at the present level, since cash contributions are at the rate of £640 per ton of metal.

As to the outlook for tin, speaking in general terms it may be considered favourable. Unless new tin fields are discovered the tendency of supplies will be downward, but consumption is likely to increase. One of the most favourable features from the point of view of tin is the tremendous expansion in the demand for tin plate.

Tin Research

Despite the encouraging figures of consumption it is still of the utmost importance to discover new uses for tin and to improve existing tin products to make tin more attractive, economically and technically, to the user, as it is by such action that the ever-present danger of a drift away from tin which follows the continual introduction of substitutes can be halted. This important work is being undertaken by the Tin Research Institute at Greenford, Middlesex, and is financed by the chief tin producers of the world through their respective Governments.

Position in Malaya

Since our last Annual General Meeting there has been a further step in the constitutional development of the Federation of Malaya. The position is that as a result of a visit by the Chief Minister of the Government and some of his Ministers to London it was agreed with H.M. Government that the Federation would be given independence within the Commonwealth if possible by August, 1957. It is but natural that such a far-reaching constitutional change should arouse some apprehension amongst investors, particularly those who are far removed from that part of the world and are unacquainted with local conditions and the trend of events. The suggestion has been made that no further capital should be invested in the country and even that capital should be withdrawn. Such action would be a very poor reply to the assurances given by the Government about overseas capital, and moreover, is open to the charge often made in certain quarters that capital exploits a country solely for its own benefit.

In view of these assurances, the Board considered there could be no justification for changing its long-established policy of continuing and expanding its operations in Malaya by improving the efficiency of existing installations and by seeking and equipping new areas. This Company has actively pursued a programme of prospecting and it is hoped that success will reward its efforts. Much is likely to depend upon the encouragement given by Government by way of alienation of land for mining.

Need for Liquidity

It will be realised that the first essential for the carrying out of a policy of expansion is a readily available fund of cash, and it is precisely for that reason that the Boards of this Company and its associated Companies have consistently retained in the business a substantial proportion of the profits in liquid form, either by writing down the fixed assets or by adding to Reserves.

Your Board feel confident that the Shareholders of Tronoh Mines Ltd. will continue to endorse the policy which has built up the Company to its present strong position while yielding a fair return on capital invested.

CONSOLIDATED AFRICAN SELECTION TRUST

ANOTHER SUCCESSFUL YEAR

MR. A. CHESTER BEATTY ON NEW DEVELOPMENTS

The 32nd annual general meeting of Consolidated African Selection Trust Limited will be held on December 13 in London.

The following is an extract from the statement by the Chairman, **Mr. A. Chester Beatty**, which has been circulated with the report and accounts for the year ended June 30, 1956:

We have had another successful year. The combined profit of your Company and its wholly owned subsidiary, Sierra Leone Selection Trust Ltd., amounted to £2,247,000. This is an increase of some £180,000 over last year's profits, resulting mainly from higher prices received for our diamond and from increased dividends received on our trade investments.

Gold Coast Operations: For three months of the year operations were to some extent disrupted by a partial strike of our African labour force. Despite this the quantity of gravel treated by the plants was slightly greater than last year, and, since we mined a higher grade of ground, our output of diamond increased substantially. During the year our costs were higher, principally due to increases in African wages.

The strike to which I have referred took place in association with a general strike in the Gold Mining Industry. The Company lost relatively little production, for more than half the labour force stayed at work, and this allowed us to achieve the diamond output called for in the year's programme.

At the time of the strike a Board of Enquiry sat to investigate the economic conditions of virtually the whole of the mining industry.

Following the publication of the Board's report and wage settlements in the industry, the Gold Coast Government have announced that they will replace the existing minerals duty by a form of taxation designed to be available for relief against United Kingdom taxes under the double taxation relief arrangements. I need hardly say how greatly I welcome this decision.

New Development

In view of the promised revision of the minerals duty we now feel justified in implementing our plans for bringing into production deposits of a lower grade than have been previously mined, and expenditure has been authorized for the purchase and erection of a new plant at Anincheche which should be in full production by mid-1959. The cost of putting this plant into operation will be in the region of £500,000. We also have under consideration the erection of further new plants to operate in other low grade areas.

Sierra Leone: Last year I referred to the compensation money which we were to receive from the Government. In February this year we received compensation amounting to £1,570,000 for the rights which your Company relinquished.

We have authorised the erection of a new plant at Tongo and this should be in operation by late 1957. This will

involve capital expenditure in the neighbourhood of £500,000.

Overseas Trade Corporations

I welcome the Chancellor of the Exchequer's promise that in next year's Budget he will seriously consider introducing legislation to give tax relief to overseas trade corporations. Such relief could be of decisive importance to United Kingdom mining companies such as ours if they are to develop new operations. This change in the basis of United Kingdom taxation of overseas productive industries is urgently necessary if this country is to regain its leading position.

The Future

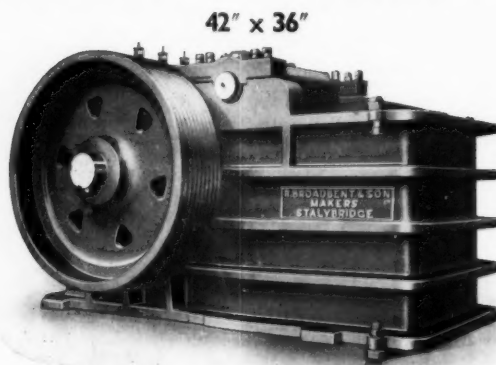
As I have already indicated in this statement, we are now installing large new plants in the Gold Coast and Sierra Leone. Moreover the proposed new basis of taxation in the Gold Coast leaves the way clear for us to examine a further substantial expansion of our operations there. If these plans come to fruition our future capital requirements will be large. Nevertheless the Company is in a very satisfactory financial position and is justified, in my view in distributing current earnings.

We are recommending for your approval a slightly increased final dividend of 3s. 3d., together with a bonus of 1s. per unit of stock, making 5s. for the year.

World sales of diamonds continue at a most satisfactory level, and it seems likely that this year's total will fall little short of last year's record of £74.3 million. The market remains strong; indeed the shortage of physical production of diamond appears to be the greatest limiting factor at present.

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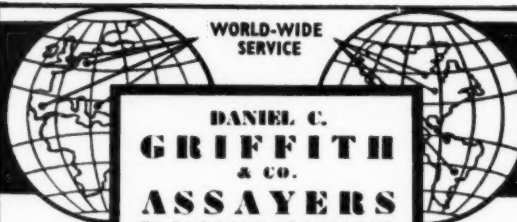
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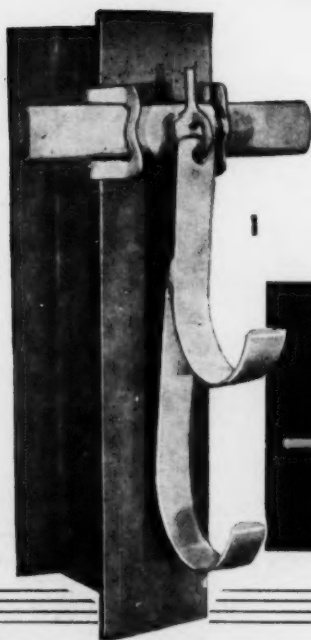
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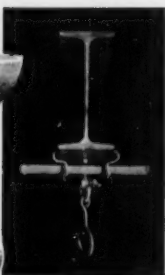
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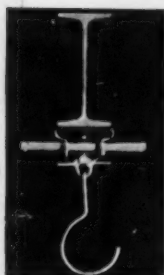
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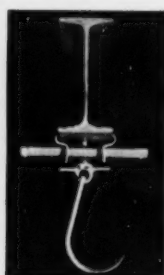
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